VICTORIA INSTITUTE
FOUNDED A.D. 1865

SURPLUS
LIBRARY OF CONGRESS
DUPLICATE

"WITHDRAWN"
SMITHSONIAN
INSTITUTION
LIBRARIES

WITHDRAWN
SMITHSONIAN
INSTITUTION
LIBRARIES

Digitized by the Internet Archive
in 2010

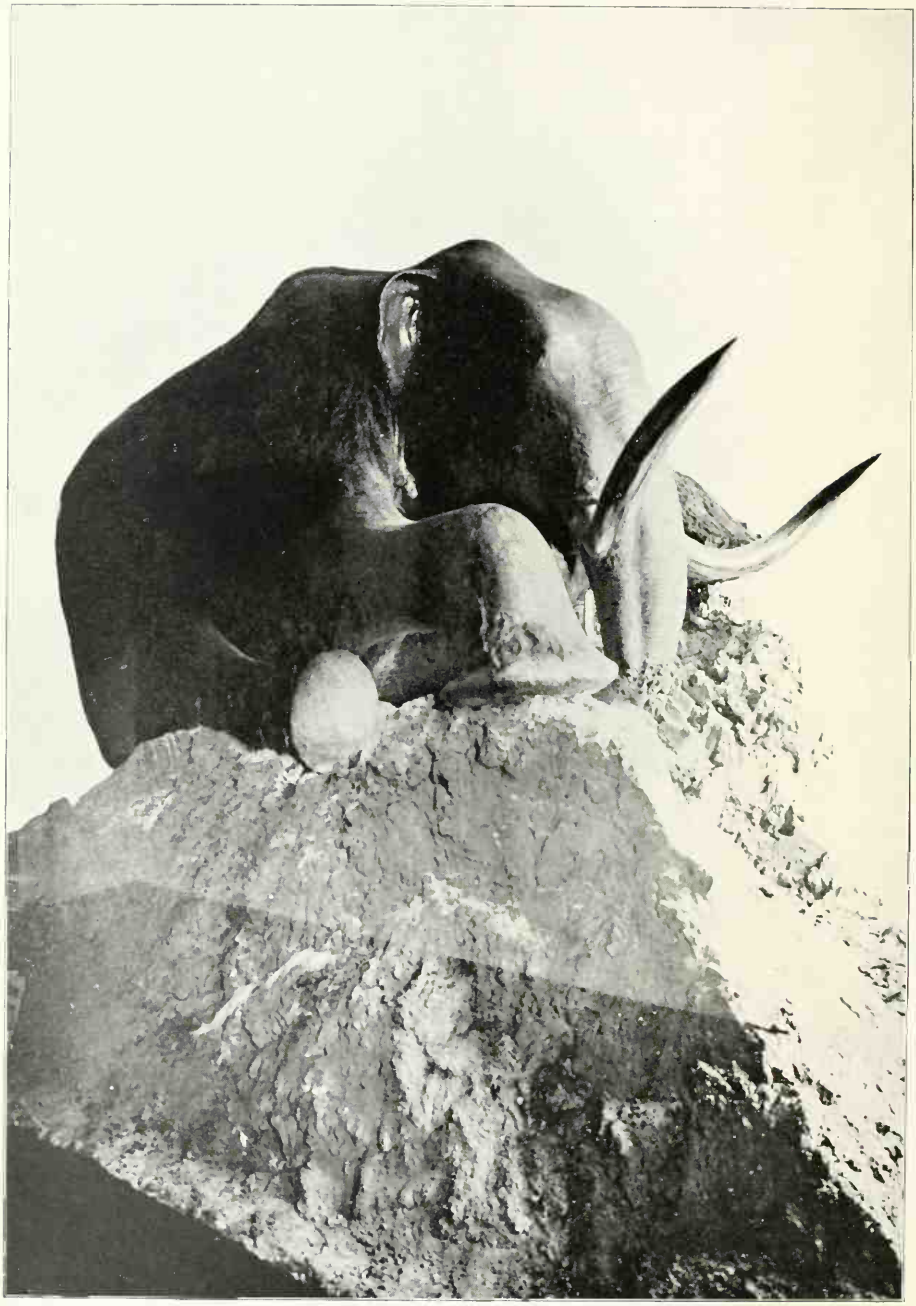
http://www.archive.org/details/journaloftransac40vict

JOURNAL OF THE TRANSACTIONS

OF

THE VICTORIA INSTITUTE.

VOL. XL.



PHOTOGRAPH OF THE NEWLY DISCOVERED MAMMOTH TAKEN *in situ*, AND NOW IN THE MUSEUM OF THE ST. PETERSBURG ACADEMY.

(*Presented by* MR. MARTIN L. ROUSE.)

JOURNAL OF

THE TRANSACTIONS

OF

The Victoria Institute,

OR,

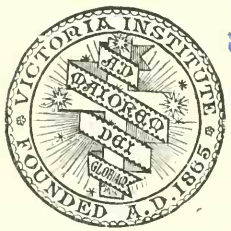
Philosophical Society of Great Britain.

EDITED BY THE SECRETARY.

CANCELLED
14553

VOL. XL.

WITHDRAWN
SMITHSONIAN
INSTITUTION
LIBRARIES



LONDON:

(Published by the Institute, 1, Adelphi Terrace House, Charing Cross, W.C.)

ALL RIGHTS RESERVED.

1908.

LONDON:
HARRISON AND SONS, PRINTERS IN ORDINARY TO HIS MAJESTY,
ST. MARTIN'S LANE.

PREFACE.

WHEN drawing up the Preface for the last Volume of Transactions, I indicated the urgency that existed for reducing the necessary expenditure for carrying on the work of the Institute, and that the Council had the matter under serious consideration. Since then, steps have been taken which will go far to diminish the expenditure—while, it is hoped, not lessening efficiency. These steps are stated in the Report of the Council—which ought to be carefully considered by all who value the work of the Institute.

In retiring from the office of Secretary, which I have held since the year 1900, I cannot but acknowledge the general support and assistance I have received from the Council and members; as also the friendly character of the letters I have received from Correspondents, sometimes of a confidential nature. It was rarely indeed that they were otherwise, and I regret that they will now be transferred to my successor. I am consoled, however, with the belief that the Volume of Transactions now being issued to our adherents will be found in no way inferior, either in the range of subjects treated, or the value of their contents, to any of its predecessors.

EDWARD HULL, LL.D.,

Secretary and Editor.

CONTENTS.

PAGE

REPORT OF THE COUNCIL FOR THE YEAR 1907, WITH BALANCE SHEET FOR THE YEAR ENDING DECEMBER 31ST, 1907 1

ANNUAL GENERAL MEETING.

ADDRESS BY MR. E. WALTER MAUNDER, F.R.A.S. 7

ORDINARY GENERAL MEETING.

PAPER ON "PRIMEVAL MAN IN BELGIUM." BY REV. D. GATH WHITLEY.

DISCUSSION: BY THE SECRETARY, REV. DR. IRVING, REV. J. MAGENS MELLO, PROFESSOR ORCHARD, MR. M. L. ROUSE, PROFESSOR J. L. LOBLEY AND DR. W. WOODS SMYTH 25

ORDINARY GENERAL MEETING.

PAPER ON "THE INFLUENCE OF THE GLACIAL EPOCH UPON THE EARLY HISTORY OF MANKIND." BY REV. PROFESSOR G FREDERICK WRIGHT, LL.D.

DISCUSSION: BY PROFESSOR HULL, PROFESSOR ORCHARD, MR. MARTIN L. ROUSE, REV. DR. IRVING, MR. HENRY PROCTOR.

LITERATURE ON NIAGARA FALLS 76

ORDINARY GENERAL MEETING.

PAGE

Paper on "Resemblances between Indian and Jewish Ideas and Customs" (*with lantern slides*). By Colonel T. Holbein Hendley, C.I.E.

Discussion: Remarks by Lieut.-Colonel G. Mackinlay and Mr. M. L. Rouse 77

ORDINARY GENERAL MEETING.

Paper on "The Glaciers, Past and Present, in the South Island of New Zealand, together with the Great Vertical Movements of the Ground." By Mr. C. Dillworth Fox.

Note on the above Paper by Rev. Dr. Irving 104

A Recent Visit to Petra: A Lecture delivered by Mr. Arthur Sutton, F.L.S.: A Short Account by the Secretary 112

ORDINARY GENERAL MEETING.

Paper on "Philosophy and Evolution." By Professor H. Langhorne Orchard, M.A.

Discussion: Remarks by Rev. Dr. Irving, Dr. W. Woods Smyth, Rev. Professor G. F. Wright, Rev. John Tuckwell, and Author's Reply 115

ORDINARY GENERAL MEETING.

Paper on "The Spread of the Existing Animals through Europe and to the Islands of the Atlantic; based on Dr. Scharff's recent Work, 'European Animals.'" By Professor Edward Hull, LL.D., F.R.S. (*Secretary*).

Discussion: Remarks by Professor G. F. Wright, Mr. W. Woods Smyth, Colonel Hendley, Dr. Woodward, Mr. J. Townsend Trench, Rev. Dr. Irving, Mr. Martin L. Rouse, Professor L. Lobley.

Reply by the Author.... 145

ORDINARY GENERAL MEETING.

PAGE

Paper on "The Decay of Ultramontanism from an Historical Point of View." By the Rev. Chancellor J. J. Lias, M.A.

Discussion: Remarks by Professor H. L. Orchard and the Secretary.

Postscript: "An Old Catholic Movement in England" 168

ORDINARY GENERAL MEETING.

Paper on "The American Fauna and its Origin." By Professor J. Logan Lobley, F.G.S.

Discussion: Remarks by Mr. David Howard, V.P., Mr. Rouse, Professor H. L. Orchard, and Mr. W. Woods Smyth 190

ORDINARY GENERAL MEETING.

Paper on "The Shia Turks." By Rev. G. E. White, Dean of Anatolia College, Turkey.

Discussion: Remarks by Lieut.-Colonel G. Mackinlay, Mr. Henry Carus-Wilson, and Professor Orchard 225

ORDINARY MEETING.

Paper "On the Evidence of Malay, Javanese, Arabian and Persian Admixture in the Inca or Keshua Language of Peru, amongst the Aymara Language of the Peasant Class." By Mr. F. W. Christian, B.A. 240

List of the Vice-Patrons, Council and Officers, Members, Associates, Library Associates, Hon. Corresponding Members, Hon. Correspondents, and Missionary Associates 250

Objects, Constitution and Bye-Laws.

Societies exchanging Transactions with the Institute.

VICTORIA INSTITUTE.

REPORT OF THE COUNCIL FOR THE YEAR 1907.

1. *Meetings.*

The subjects dealt with at the ordinary meetings during the past session may be arranged under the following heads:—

1. Philosophical.

"Philosophy and Evolution." By Professor H. Langhorne Orchard.

2. Geographical.

"The Atlantic islands and origin of their fauna." By the Secretary, Professor Edward Hull, F.R.S.
"The History of the Spread of the North American fauna." By Professor J. Logan Lobley, F.G.S.
"Views of Petra." By Mr. Arthur W. Sutton, F.L.S.
"The Southern Alps of New Zealand, and their Glaciers." By Mr. C. Dillworth Fox.
"On Primeval Man in Belgium." By Rev. D. G. Whitley.
"On the influence of the Glacial Period upon the early history of man." By Professor C. Frederick Wright.

3. Historical and Ethnological.

"Resemblances between Jewish ideas and customs and those of India." By Colonel T. H. Hendley, C.I.E.
"On the Shia Turks." By Rev. G. E. White.
"On the decay of Ultra-Montanism from an historical point of view." By Rev. Chancellor Lias, M.A.
"On the evidence of Malay, Javanese and Persian admixture of the Inca language of Peru." By Mr. F. W. Christian, B.A.

From the above list it will be seen that during the past session the subjects discussed have been of wide interest.

2. *Resignation of the Secretary.*

At the Meeting of the Council held on Monday, June 1st, 1908, the Secretary announced his intention to resign the office which he had held since the year 1900, on several grounds, chiefly those of health.

The Council thereupon passed a resolution expressing a hope that the Secretary would continue his interest in the work of the Institute and accept the honour of becoming a Vice-President; upon which the Secretary expressed his gratitude and high appreciation of the support he had received from the members, and accepted with pleasure the honour proposed to be conferred upon him.

3. The following are the changes since last meeting in the list of Officers and Council which await confirmation by the Members:—

Sir David Gill, K.C.B., LL.D., F.R.S., has been nominated Honorary Correspondent, in the place of the late Lord Kelvin. (Resolution of Council, June 1st, 1908.)

The present Secretary on retiring from office to be Vice-President (Resolution of Council, May 25th, 1908), and Mr. W. E. Thompson Sharpe has retired from the Council owing to ill-health. This leaves a vacancy on the Council to be filled up; and members are reminded that the Council will always gladly receive names for this purpose.

4. The following is the new list of the Officers and Council:—

President.

The Right Honourable The Earl of Halsbury, M.A., D.C.L., F.R.S.

Vice-Presidents.

Sir T. Fowell Buxton, Bart., K.C.M.G.
W. H. Hudleston, Esq., F.R.S., F.G.S.
Alexander McArthur, Esq., D.L., J.P.
David Howard, Esq., D.L., F.C.S.
Lieut.-General Sir H. L. Geary, K.C.B.
Right Hon. Lord Strathcona and Mount Royal, LL.D., F.G.S
Prof. Edward Hull, LL.D., F.R.S., F.G.S.

Honorary Correspondents.

Sir David Gill, K.C.B., LL.D., F.R.S.
Professor A. Agassiz, D.C.L., F.R.S.
Professor E. Naville (*Geneva*).
Professor Maspero (*Paris*).
Professor A. H. Sayce, D.D., LL.D.
Professor Fridtjof Nansen, D.Sc.
Professor Warren Upham, D.Sc.

Honorary Auditors.

J. Allen, Esq.
Lieut.-Col. Mackinlay, late R.A.

Secretary and Editor of the Journal.

Professor Edward Hull, M.A., LL.D., F.R.S.

Council.

(*In Order of Election.*)

D. Howard, Esq., D.L., F.C.S., F.I.C., (*Trustee*).
Rev. Dr. F. W. Tremlett, D.D., D.C.L., Ph.D.
Very Rev. Dean Wace, D.D. (*Trustee*).
Rev. Chancellor J. J. Lias, M.A.
Rev. Canon R. B. Girdlestone, M.A.
General Halliday.
Rev. John Tuckwell, M.R.A.S.
Lieut.-Colonel Mackinlay, late R.A.
Theo. G. Pinches, Esq., LL.D., M.R.A.S.
Ven. Archdeacon W. M. Sinclair, M.A., D.D.
Commander G. P. Heath, R.N.
Rev. G. F. Whidborne, M.A., F.G.S., F.R.G.S.
Lieut.-Gen. Sir H. L. Geary, K.C.B., R.A.
Edward Stanley M. Perowne, Esq., F.S.A.
Martin Luther Rouse, Esq., B.L.
Colonel T. Holbein Hendley, C.I.E.
Arthur W. Sutton, Esq., F.L.S.
Rt. Rev. Bishop J. E. C. Welldon, D.D.
Professor H. Langhorne Orchard, M.A., B.Sc.
Sydney T. Klein, Esq., M.R.I.
Rev. Prebendary H. E. Fox, M.A.
Colonel C. E. Yate, C.S.I., C.M.G.
William J. Horner, Esq.
Frederick S. Bishop, Esq., M.A., J.P.

5. *Obituary.*

The Council regret to have to record the death during the past year of the following supporters of the Institute:—

W. Bodkin, Esq., M.D., Rev. Professor W. A. Crawford, Right Rev. Bishop of Down, Connor and Dromore, Trevor C. Edwards, Esq., Surgeon-Major J. G. Gibbs, W. A. Hepburn, Esq., Joseph Ince, Esq., F.G.S., W. Levering, Esq., H. C. Nisbet, Esq., Rev. F. Paynter, M.A., Rev. F. A. Stewart-Savile, J.P., Dr. C. B. Warring, Right Rev. Bishop A. Webb, Dr. Thomas Woods.

6. *The Gunning Prize.*

The Council have now for the second time to announce the terms for the "Gunning Prize" Essay, which is to be competed for, and the result to be announced at the first meeting of the Institute at the commencement of the next Session. A paper containing the rules as to the award of the prize and the needful directions for the competition will be sent out immediately; meanwhile it may be stated that the subject of the essay will be "The Attitude of Science towards Miracles," and the amount of the prize will be £40.

7. *Library and Missionary Associates.*

For the purpose of securing a wider circulation for our volumes of *Transactions* the Council at their meeting on December 9th, 1908, passed a resolution by which public schools, Colleges and Libraries might join in subscribing 12*s.* 6*d.* per annum, thus becoming affiliated under the title of "Library Associates," and receive a copy of the annual volume of *Transactions*. Up to the present about twenty-six libraries have availed themselves of the privilege, and others have indicated their intention of joining.

The Council call attention to the special terms offered to missionaries who may become Associates on paying half a guinea per annum. Twelve have joined already, and others will doubtless join when they know the nature of the offer.

Financial.

The Council have to report that, although there appears to be no diminution of interest in the work of the Institute on the part of its supporters, yet its financial position is not what it ought to be.

In order to reduce expenditure, the Council has taken a lease of new offices in its old neighbourhood, whereby a saving of £75 a year will be effected; and it has been resolved that the honorarium of the Secretary be reduced, a regrettable, though unavoidable, resolution.

It would be an advantage to the Institute if it had more Life Members, and also if those who join would become Members rather than Associates.

The following statement will show the number of the supporters of the Institute, including Hon. Corresponding Members at the end of May, 1908:—

Life Members	34	in number.
Annual Members	107	„
Life Associates	65	„
Annual Associates	296	„
Missionary Associates	12	„
Hon. Corresponding Members ...	180	„
Total	694	

The Balance Sheet to 31st December, 1907, has been duly audited, the Hon. Auditors being Colonel Mackinlay and Mr. John Allen, to whom the Council tender their thanks.

Special Fund.

In addition to the subscriptions to the Financial Appeal received last year, the following have since come in and are now acknowledged with thanks:—

	£	*s.*	*d.*
Miss Freeman	1	1	0
Admiral Gissing	0	10	6
Colonel Alexander W. C. Bell	1	0	0
Professor Edward Hull	10	5	0

Conclusion.

Such is a summary of the work and position of the Institute during the past year, and the Council hope that, with the blessing of God, a prosperous future awaits the Institute in the years to come.

Signed on behalf of the Council,

HALSBURY,

President.

The above Report of the Council was read at the Annual Meeting of the Institute held on July 15th in the rooms of the Geological Society, and its adoption was moved by the Rev. Dr. Irving, seconded by Rev. Loton Parry, and being put to the meeting by the President was carried unanimously.

BALANCE SHEET, *year ending December 31st, 1907.*

RECEIPTS.

	£	s.	d.	£	s.	d.
Balance from 1906				18	14	3
Subscriptions:—99 Members, 1907.. ..	207	18	0			
2 „ 1908	4	4	0			
1 Associate, 1905 ..	1	1	0			
17 Associates, 1906 ..	17	17	0			
259 „ 1907 ..	271	19	0			
11 „ 1908 ..	11	11	0			
				514	10	0
Sales				55	1	2
Dividends on 2¾ p.c. Consols				21	0	6
Donations				11	16	6
Loan from Barclay and Co.				100	0	0
Sale of £230 Consols				198	3	7
Balance debtor Bills owing £203 11*s.* 8*d.*, less cash in hand £24 11*s.* 6*d.*				179	0	2
				£1,098	6	2

EXPENDITURE.

	£	s.	d.
Printing	163	15	9
Postage	33	7	6
Binding	43	11	9
Stationery	9	16	7
Expenses of Meetings	10	16	6
Clerk—Salary	118	1	0
„ Insurance	2	10	10
Rent	135	0	0
Housekeeper	0	18	6
Coal and Light	5	1	8
Library	7	8	1
Secretary	150	0	0
„ Travelling	7	10	0
Fire Insurance	0	12	0
Bank Charges	1	2	10
Sundries	3	12	6
1st Bank Loan repaid, October, 1906	100	9	10
2nd „ „ „ February, 1907	100	19	2
Unpaid Bills	203	11	8
	£1,098	6	2

There is a Capital sum of £770 2¾ Consols, also the Capital of the Gunning Trust Fund, £508 Great India Peninsular Railway Stock.

GUNNING PRIZE FUND.

	£	s.	d.
Balance from 1906	26	10	6
1907, Jan. 4th. Interest	13	0	7
1907, July 4th. „	7	4	9
Balance Credit	£46	15	10

We have examined the Balance Sheet with the Books and Vouchers and find it correct.

May 14th, 1908.

JOHN ALLEN,
GEORGE MACKINLAY, Lt.-Col., } *Auditors.*

THE ANNUAL GENERAL MEETING OF THE INSTITUTE

WAS HELD IN THE ROOMS OF THE GEOLOGICAL SOCIETY ON WEDNESDAY, JULY 15TH, 1908.

THE RIGHT HON. THE EARL OF HALSBURY, D.C.L., F.R.S., PRESIDENT, IN THE CHAIR,

When the following Address was delivered by MR. E. WALTER MAUNDER, F.R.A.S., of Greenwich Observatory.

THE BIBLE AND ASTRONOMY.

I MAKE no apology for the subject which I have chosen for this afternoon's Address. It comes directly under the first of the three primary objects for which your Society was founded —"to investigate fully and impartially the most important questions of philosophy and science, but more especially those which bear upon the great truths revealed in Holy Scripture." My effort this afternoon, therefore, is to ascertain whether Holy Scripture can throw any light upon that particular science in which it has been my good fortune to be a labourer, and whether, in its turn, that science can throw any light upon Holy Scripture. In brief, What has the Bible to say respecting astronomy, and what has astronomy to say respecting the Bible?

A few centuries ago no one would have hesitated as to the answer which should be given to the first of these two questions. It was then thought that the Bible had everything to tell us, not only about astronomy, but about all the other sciences. It was the universal textbook. More important still, it was the infallible textbook. Every statement made in it was not only correct colloquially, but was scientifically accurate. The true way of attaining further light upon some question of physical research was, not to make experiments and observations on the object itself, but to enquire more searchingly into the rigorous meaning of the original words used in Scripture.

This idea of the function of Holy Scripture was, it seems to me, an unreasonable one. God has endowed us with our intellectual faculties, and we know of but one way in which they can be developed and improved, namely, by their exercise. If it had been His purpose to give us in Holy Scripture direct instruction on astronomy, geology and the like, what effect could this have had but the retardation of man's intellectual growth? We know that the schoolmaster who can train his pupil to find something out for himself has done far better for him, has *educated* him better than if he had merely *told* him

twenty times as much. We need not think then, as our forefathers did, that the references in the Bible to the sun's rising and setting and to his course across the sky, ever, at any time, justified men thinking that they had in them divine authority for asserting that the sun went round the earth. Nor need we suppose that the first chapter of Genesis was meant to give us a compact little bird's eye view of the geological and biological history of our globe. It is surely more reasonable to conclude that there was in that chapter no purpose whatever of teaching us anything about the physical relationships of land and sea, of tree and plant, of bird and fish; it seems, indeed, scarcely conceivable that it should have been the divine intention so to supply the ages with a condensed manual of the physical sciences. What useful purpose could it have served; what man would have been the wiser or better for it; who could have understood it until the time when men, by their own intellectual strivings had attained sufficient knowledge of their physical surroundings to do without such a revelation at all.

What answer then have we to give to our first question, "What has the Bible to say respecting astronomy?" In a real sense it has nothing to say whatsoever. The contrary idea that it had something to say was responsible for one of the great defeats of the Church, a defeat which has left its mark to the present day, the evil influence of which is incalculable, and is present with us continually.

One of the greatest men of science that the United States of America has yet produced, Dr. J. W. Draper, brought out a book entitled the *Conflict between Religion and Science*, and the chief incident that figures in that book is the well-known case of the condemnation of Galileo. It is an old story, one that has been told many a time, but it is worth while to tell it briefly yet once again, since the true lesson of the story is very generally missed

In February, 1616, the Qualifiers or official experts of the Holy Office, reported upon two propositions extracted from Galileo's work on sunspots. The propositions were:—

1. The sun is the centre of the world, and, therefore, immovable from its place.
2. The earth is not the centre of the world, and is not immovable, but moves, and also with a diurnal motion.

The report of the Qualifiers ran as follows:—

1. The first proposition is unanimously declared to be false and absurd philosophically, and formerly heretical, inasmuch as it expressly contradicts the

doctrines of Holy Scripture in many passages, both if taken in their literal meaning, and according to the interpretation of the Holy Fathers and learned theologians.

2. The second proposition is declared unanimously to deserve the like censure (as the first) in philosophy, and, as regards its theological aspect, to be at least erroneous in faith.

Sixteen years later, Galileo brought out his most popular work, *Dialogues on the Ptolemaic and Copernican Systems*, and the appearance of this book caused him to be summoned to Rome to answer a charge of heresy. The points upon which his teachings had been formerly condemned were brought up again, and he was compelled to abjure them explicitly. It is not necessary for me to go into the melancholy history in detail; to paint again for you the sorrows and sufferings of the old philosopher, to enlarge upon the inveterateness of his enemies, or the bitterness of his humiliation. We are all at one in condemning the treatment bestowed upon him; we are all at one in declaring the verdict upon him to have been wrong.

But why was it wrong? Wherein was it wrong? It is necessary for us to look very carefully at that, as there is much misapprehension as to wherein the error lay.

It is clear to all of us that the Qualifiers were utterly wrong in seeking to uphold the doctrine of Ptolemy that the earth is the centre of the universe and is immovable. But their critics overlook that they would have been equally wrong if they had substituted for the Ptolemaic theory the theory which Galileo was promulgating. These were the only two theories then before the world, and we know to-day that both were wrong. Two propositions were under consideration—the motion of the sun and the motion of the earth.

With regard to the first, the Ptolemaic theory declared that the sun moved. And the sun does move, but not at all in the sense in which the Ptolemaist used the words. Galileo held that the sun was immovable and in the centre of the universe. This we know to be untrue, though the statement was partly justifiable in the limited knowledge that Galileo possessed.

With regard to the second proposition, namely, that the earth was immovable we know that Ptolemy was wrong and Galileo right. But here again Galileo was at fault in the demonstration which he offered, as he gave the tides as the chief proof of the diurnal rotation of the earth, and refused to admit that they were due to the action of the moon.

We see then that if the Holy Office had done as Galileo would have had them do, as the apologists of to-day for Galileo would have had them do, if they had given approval to his views and had sent them forth with the seal and approbation of the Church, it would have inevitably followed that a century later she would have been compelled to launch her thunders against Sir Isaac Newton when he showed that the tides were due to the moon, and two centuries later against Sir William Herschel when he showed that not only the earth but also the sun was in motion. The error of the Holy Office in 1616 and 1633 lay not that they had put the seal of the Church on the wrong scientific doctrine, but that they had put it on a scientific doctrine *at all*. In a word they had confused the provinces of religion and of science. They used the Holy Scriptures in order to prove the relation of one astronomical body to another. It happened by a curious coincidence that, through a twofold ignorance, one of their decisions was verbally and superficially correct. Galileo's proposition "that the sun is the centre of the world" (*i.e.*, of the universe), "and therefore immovable from its place," has been condemned not only by the Holy Office but by the progress of science since his day. That coincidence in no way palliates their fault, which lay in the fact that they were applying Holy Scripture to a purpose for which it was never intended.

Some three years ago, when Professor Silvanus Thompson was giving a corresponding address to that which I am privileged to give to-day, he gave you a brief but eloquent summary of the marvellous development which physical science has made during the last few years. A man must indeed be blind and deaf to all that is going on around him if he does not recognise how faithful that picture was. The progress that has been seen in every field of science within the last half century is amazing, and the rate of that progress seems to be accelerated every year. The twentieth century has not yet seen its eighth birthday, yet, scientifically speaking, the nineteenth century has already become antiquated. If we could conceive that in the year 1900 the Church had been prevailed upon to adopt the science of that year as its own and to put its seal upon it, as final truth, now, in the year 1908, we should have already had more than one Galilean persecution; so far as that verdict of finality had been imposed, science would have been hindered, thwarted, sterilized, and the Church herself would again have been brought into dishonour as the enemy of progress and thought.

Yet at all times, eight years ago, as to-day, there have been those, some of them leaders in science, some leaders in theology, who would have had the seal of final authority set upon the science of the day, in astronomy, geology, biology, Biblical criticism, archæology, and each and all of the other sciences, and would have had the Church make it her own as the Church in Galileo's day, had made her own the science of Ptolemy and Aristotle. There was some excuse for the Qualifiers of the Holy Office in 1616, in thinking that the Ptolemaic idea of the solar system was eternal truth. The evidence of men's senses seemed to show them that the earth is solid and immovable; the evidence of men's senses seemed to show them that the sun and stars move round the earth every twenty-four hours, and that the sun has a further motion round the earth once every year. A great and elaborate science had been built upon this basis, which enabled the movements of the planets to be correctly foretold, and this theory had lasted without challenge for thousands of years. There is no excuse for any man repeating their mistake to-day, when science is progressing, that is to say, is changing, with a rapidity that has never been witnessed in the history of the world before. It is the glory of science that it does progress; that is to say, it is the glory of science that it changes, that it is continually undergoing reconstruction, that it continually requires restatement.

Can the Holy Scriptures ever have been intended to teach us that which must always from its very nature be undergoing change? Is it not manifest that they deal with something very different; that is to say, not with science, the relation of thing to thing, but with religion, the relation of man to God. And in religion we find that which is essential and eternal. The creed, given to Israel of old, still remains true: "Hear, O Israel, the Lord our God is one Lord"; and the practical application of that creed to conduct, requires neither reconstruction nor restatement: "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind, and with all thy strength": And "Thou shalt love thy neighbour as thyself." Science deals with fact, which is temporal; religion deals with truth, which is eternal.

In a very real sense, therefore, the Bible has nothing to tell us of science, and therefore, nothing to tell us of the science of astronomy. Let us reverse the question, and ask, "What light has astronomy to throw upon the Bible?" This question we can treat from two points of view; from the point of view of the astronomy of the times when the books of Holy Scripture

were severally composed, and from that of the astronomy of the present day.

The former enquiry need not involve us in any question of the higher criticism, for though the dating of the books of the Bible, once almost universally accepted, has been so greatly disturbed within the last sixty years or so, we find in dealing with astronomy that we are relieved from the necessity of fixing the true dates of the various sacred books since we know that the science underwent very little change between the earliest and latest dates that can, upon any hypothesis, be assigned to any of them. For, on the one hand, the constellations, substantially as they are preserved to us in the poem of Aratus, were certainly designed before the time of Abraham. On the other hand the Old Testament Scriptures had been completed before the great astronomical revolution was affected which we associate with the name of Hipparchus of Bithynia. In the period of more than 2,000 years which separated the two, there was, beyond doubt, some advance: the five planets were discovered, and their movements watched with some degree of particularity; the calendar was set in order, different devices for this purpose being adopted in different countries; but broadly speaking, we may say that astronomy underwent no revolutionary development during the whole of this period, just as later there was no important change between the days of Hipparchus and those of Copernicus and Galileo. Broadly speaking we may say that the astronomy of the ages during which the Old Testament Scriptures were being written, was the astronomy of the constellations.

The constellations of Aratus and of Ptolemy themselves reveal to us their date by a simple fact. They do not cover the whole sky, but leave untouched a large space in the south, which evidently represents the invisible part of the heavens at the time and place of the origin of the constellation figures. Somewhere between N. Lat. 40° and 35°, sometime in the third millennium before our era, the astronomers of the ancient world set their hands to this great task, the task of making a primitive catalogue of the stars.

It is not only that the constellations were the chief asset of astronomy in general during the two thousand years between Abraham and the translation of the Hebrew Scriptures into Greek; they formed in all probability a principal part of the Hebrew astronomy. For we know from the constellations themselves, that they were designed before the time of Abraham. And we also know from Babylonian "boundary stones" and

inscriptions, that they were familiar at an early period in the very country from whence Abraham came out.

This inference gives, to an astronomer, a special interest to not a few Scripture passages. We know that Abraham and Moses, David and Amos, must have looked upwards to the same shining eyes as those that look down upon us, and it seems to bring those ancient worthies nearer to us, if we realise that those stars were associated to them with the same imagined frescoes as they are to us. To them, as to us, Ophiuchus strangled the Snake and trampled on the Scorpion; the Kneeler crushed the Dragon's head; the Virgin held the Ear of Corn; and the giant Orion attacked the Bull.

We find evidence of the acquaintance of the Hebrews with the ancient constellations in Joseph's dream, wherein the "eleven stars" evidently signify eleven out of the zodiacal twelve; the twelfth, traditionally Taurus the leader, representing Joseph himself. We learn from St. Stephen that the worship of the golden calf in the wilderness, was "star-worship"; the Israelites choosing the form of a calf, presumably because it was the form of Taurus:—

"The white bull with golden horns that opens the year,"

to quote Virgil. It was the stellar bull, the leader of the host of heaven, that they were worshipping as Him Who had led them out of the land of Egypt.

There is a definite and direct reference to one of the constellation forms in the twenty-sixth chapter of the book of Job. There Job says of God that:—

"By His spirit He hath garnished the heavens.
His hand has formed the crooked serpent."

Here the parallelism of Hebrew poetry obliges us to take "hath formed the crooked serpent" as a restatement of "hath garnished" (that is adorned) "the heavens"; the great constellation of the writhing Dragon, emphatically a "crooked serpent," placed at the very crown of the heavens, and encircling its two northern poles, being poetically put for all the constellations of the sky.

The ancient constellations have a very high archæological value, and this in two directions. First, they preserve to us a record of the earliest scientific work of man. Next, they throw an important light on the origin of myth.

For it is clear that the constellation figures were associated with the stars upon a deliberate, and, in the strictest sense, a scientific plan. The science was real if primitive. The

twelve constellations of the zodiac were clearly meant to mark out the apparent path of the sun, a fact that shows that the length of the year had been at least roughly determined, and that means had been found for identifying the sun's place amongst the stars, with whom he is never seen. The equator was marked as well as the ecliptic, the long constellation of Hydra being formed for this purpose. These two great circles being so clearly indicated, the significance of the position of the northern dragon, coiled symmetrically round their two poles, becomes apparent, as well as the attitude of a third serpentine figure, the snake carried by Ophiuchus, which is bent into a right angle at the intersection of the equator with the equinoctial colure. These positions of astronomical importance were no doubt marked by serpentine forms, because such could be bent or stretched out to take any desired shape. Further evidence of astronomical knowledge and of deliberate purpose is seen in the zodiacal figures: the ascending signs, facing the east, the sunrise; the descending, facing the west, the sunset. Thus the solstices were recognised and marked out as well as the equinoxes.

Such knowledge, such designs, were not within the reach of savages; they could only have resulted from steady and definite observation carried on for the purpose. But we are familiar with an immense number of myths, devised to explain how the constellations came into being, or else representing the sun as the hero of some exploit, suggested by one of the zodiacal figures. None of these myths could have preceded the formation of the constellations, none of these myths could have given rise to the constellations. The types of mind and states of civilization required for such a work as the construction of the constellations and for the inception of myths are wholly diverse; more than diverse, opposed and incompatible. All such myths, therefore, are not only later than the constellations but they imply that the constellations had been known, and their meaning forgotten or misunderstood. Such myths therefore are the evidence of knowledge on the downgrade; of astronomical knowledge lost; not of astronomical knowledge incipient.

The myths did not give rise to the constellations, but when the true origin of the constellations was forgotten, and the astronomical facts that they expressed were lost or misunderstood, then myths were invented to explain them; they were the ditch into which the blind led the blind. And as with astronomical myths, so no doubt with other nature myths; for myth is essentially the outcome of ignorance, the confusion of

things that differ, the artificial attempt to explain that which is unintelligible to the narrator.

Let me take one example. My friend, Dr. Hind, the explorer of Assiniboia and of the Labrador river Moisie, told me that his Indians were accustomed "to fix the sun" by setting two stakes, one upright, and the other to fit its shadow. In this way the members of the party following after could judge of the height and direction of the sun when the leaders passed, and so learn how many hours' journey they were ahead. If we turn now to Dr. J. G. Frazer's *Golden Bough*, vol. i, pages 117–119, under the title "Staying the Sun," we find a number of anecdotes. Dr. Frazer writes:—

"In their journeys the" (Australian) "natives are accustomed to place stones in trees at different heights from the ground, in order to indicate the height of the sun in the sky at the moment that they passed the particular tree. Those who follow are thus made aware of the time of day when their friends in the advance passed the spot."

The Indian custom mentioned by Dr. Hind, is an exceedingly simple, but pretty and effective, way of marking the time. The Australian custom, *as reported*, is perfectly useless, being incomplete. The question arises, is the incompleteness due to the stupidity of the explorer who did not understand what the natives told him, and left out the essential feature? Or did the Australians retain a vestige of a useful custom after they had ceased to understand its purpose and meaning? An allied Australian custom is reported thus:—

"When an Australian blackfellow wishes to stay the sun from going down till he gets home, he puts a sod in the fork of a tree, exactly facing the setting sun."

Did this mythical idea of "stopping the sun" arise from the stupidity of the Australian savage, who had retained and misunderstood a vestige of a once useful custom, or from the stupidity of the European, ignorant of the contrivances and necessities of primitive life? In either case the myth arises from knowledge lost. It is evidence of ignorance.

In astronomy then, we find that the sequence—whether now or in primitive ages—is observation, knowledge, then knowledge lost or misapprehended, then myth; and not the converse (as it is usually contended) of myth, out of which observation grows, and thence knowledge is gained.

Might I ask your serious consideration of the point which I have raised here, namely, that in the case of constellation

myths, we have direct evidence that they are knowledge lost. An immense amount has been written upon myths in recent years, and the assumption has almost always been that they are primitive, original, the first stage towards knowledge. That is an assumption, and,—in this case, where we can test it,—it is an untrue assumption.

If, in science, myth means the degradation of knowledge, does the very opposite of this hold good in religion? Have we the right to assume that in religion, myth is knowledge in the germ?

In the Address given you a year ago, Dr. Welldon affirmed that it is so. He said:—

"Primitive man then personifies Nature. He spiritualises Nature. He invests objects not with life only but with will; and his religion, as expressing the relation which he conceives to exist between his own spirit and the spiritual force outside himself, naturally takes the form of an attempt to influence the unseen powers in which he instinctively believes.

"This is the beginning of religion. It contains the germs of all the infinitely various creeds and cults which have elevated or desolated humanity.

"For as man's intellectual faculties were strengthened by observation and reflection, it was almost inevitable that he should effect the speculative transition from so-called idolatry to polytheism, from the worship of many gods to the worship of fewer gods, and in the end to monotheism. The spiritual powers resident in all natural objects converge into the one great spiritual power who is called God. And the gradual ennoblement of religion lies in the purging away of all the material imaginations which have gathered around the pure spirituality of God Himself. For when once the existence of spiritual beings, many or few, was apprehended, the belief in the supreme Being was a sure result of time and thought."

Is this so? Have we on record a single observed case in which a religion has evolved in this sequence of spiritism, polytheism, henotheism, and finally monotheism? Have we in all history an example of polytheism passing into monotheism except through the influence of monotheism from without? We have abundant illustration of a conflict between the two ideas—coming from different quarters—and of the victory of the purer faith. But where and when have we an instance of the direct evolution of polytheism into the worship of One and Only God?

On this point let us look at the evidence supplied by the first

chapter of Genesis, and read verses 14–19, especially verse 16:—

"And God made two great lights, the greater light to rule the day and the lesser light to rule the night: He made the stars also."

I would ask you to weigh the extreme simplicity of these words, and to see what it signifies. Consider that the sun and moon have no distinctive names assigned to them. There is no recognition of any of the planets. There is no recognition even of the grouping of the stars into constellations. The celestial bodies could not be referred to in a more simple manner.

What does that mean? It means that we have before us the expression of man's earliest observation of the heavenly bodies. Whenever the book of Genesis as a whole was written, there was incorporated in it this primitive record whether preserved orally or in writing. But primitive it is beyond possibility of challenge. It is probably the earliest document existing. The astronomy is indeed primitive and simple in character, the very simplest possible, but it is astronomy of observation. It concerns the observed brightness of sun, moon and stars. But it is not myth; there is not the faintest trace of the deification of sun, moon or stars, or of spiritism. There is no confusion of ideas; no anthropomorphic treatment of sun or moon.

And as the astronomy of the chapter is simple and sane, and (we may truly say to the very small extent that it goes) scientific; so is the religion of the chapter. It is, as we have seen, a primitive document, but there is no personification of Nature, no spiritualisation of Nature, no endowing natural objects, not with life only, but with will. There are no myths of hideous demon monsters and of unnatural births. There is no confusion of ideas; no inability to discern between Creator and Creation. The religion of the chapter,—the religion of this earliest age,—is perfect in its sanity and truth.

But it has been urged that this first chapter of Genesis was borrowed by the Jews from a Babylonian Creation Epic, though we are obliged to suppose that, as Professor Fr. Delitzsch puts it, "the priestly scholar who composed Genesis, Chapter I, endeavoured of course to remove all possible mythological features of this creation story." It has escaped the notice of those who press this view that it ascribes a measureless superiority in intellectual and spiritual standing to the Jew over the Babylonian, seeing that the former could recognise and bring to light the truth hidden beneath the debased and irrational Babylonian myth. But there is no need to suppose this miracle. The evidence of any connection between the

account of creation given in the Babylonian poem and that given in Genesis, is of the slightest. Any account of creation, mythical or otherwise, must necessarily notice the chief classes of natural objects, and to that extent any one account must resemble any other. Beyond that the only point in common between the two narratives lies in the resemblance between the Hebrew word for "deep," (*tehom*), and the Babylonian name, (*Tiamat*), given to the she-dragon of Chaos. If this resemblance is sufficient to show a connection, then it is indisputable that the Babylonian myth must be a distortion of the narrative in Genesis, since the natural object itself, which gives us the Hebrew word, must necessarily have preceded the mythological personification of it, which gives us the Babylonian. Besides, as we have seen, the astronomy of the Genesis narrative is primitive, the earliest possible. The Babylonian epic, on the other hand refers to the equal division of the zodiac, and hence the epic must be of later date than 700 B.C., since that is the earliest date at which such division can have taken place.

Throughout the Holy Scriptures there is but one astronomical reference that may be fairly termed mythical. When Job cursed the day on which he was born he said:—

> "Let them curse it who curse the day,
> Who are skilful to rouse up leviathan
> Let the stars of the twilight thereof be dark:
> Let it look for light, but have none;
> Neither let it behold the eyelids of the morning."

Here leviathan is the mythical dragon of eclipse derived from one of the stellar dragons; either *Draco* who curled in a figure of eight round the poles of the then equator and ecliptic, or *Hydra* who then stretched almost from one node to another along the equator. The symbol of a coiled snake is used in astronomy to this day as the ideogram of a "node," and since the moon must be at one of the nodes of her orbit for an eclipse to take place, with its consequent darkness, the myth early arose (again an instance of knowledge lost), that the eclipse was due to a dragon devouring the sun or the moon. But in referring to leviathan, this dragon of eclipse, Job was no more necessarily giving his assent to the myth than we are, when we speak of a "draconic month," meaning the period that the moon takes from one passage through her node until her next passage through the same node.

Poetry, allegory, fable, all presuppose purpose, knowledge, clearness of perception in the originator. Human words and

actions may be ascribed to animals or things, but neither speaker nor hearer really mistake their true relations. Of astronomical allusions of this poetical character, there are many in the Bible, but there is no confusion of identity. In Psalm xix, the writer likens the sun to a bridegroom, coming forth from his tent. But the likeness lies only in its splendour; the writer does not consider the sun to be actually a bridegroom, and endow him with a bride and children. In the myths of the nations surrounding the Israelites, of Baal, of Istar, of Merodach, the characteristics, human and animal, divine and astronomical, are mingled together in inextricable confusion, and it is impossible to say whether Istar is goddess or woman, or supernatural cow, or the moon or the planet Venus, or the Virgin of the zodiac, or the sun when in that sign, or the personification of passion, or of the powers of reproduction, or the confusion of any and all of these. This confusion is the essential quality of myth, and it leads up to no clearness of thought, to no knowledge, either in science or in religion.

I have already said that from the point of view of their astronomical bearing, it does not matter how we date the books of the Bible, since there was no great development of astronomy during the whole period covered by them. The constellations had already been designed before the earliest book was written. The great advances which took place under Hipparchus were not made till after the Old Testament Canon was complete.

But reversing the position we do find that some astronomical allusions of Scripture can throw a little light on the dating. Thus there are three constellation names in Scripture, *Ash*, *Kimah* and *Kesil*. All three terms occur in the book of Job, two of them occur in Amos, and one in Isaiah. What do they signify, and from what source do they come?

Here we are met with a difficulty. The meaning of these names was lost before the Seventy made their rendering of the Hebrew Scriptures into Greek; for in one passage they left *Kimah* and *Kesil* untranslated, and they translated *Ash* and *Kesil* differently in different passages. The names have not been found as yet as stellar names on any cuneiform inscription; indeed, had their significance been known in Babylon, it is most improbable that the Alexandrian translators would have failed to obtain the necessary information therefrom. But it is clear that the prophet Amos and the writers of the book of Job, and of the thirteenth chapter of Isaiah were quite familiar with them. The obvious and sufficient explanation of the later ignorance respecting them, lies in the terrible catastrophes which overtook

the sister kingdoms of Israel and Judah; their conquest and carrying away into captivity. Those critics are therefore right who assign Job and this portion of Isaiah to the period before the captivities, and the three names come to us as the indications, not of a Babylonian science of astronomy learned by the Jews during their exile, but of a Hebrew astronomy destroyed by the unspeakable disaster of the captivity. And when you come to think about it, the complete conquest of a country by a ruthless invader, wiping "Jerusalem as a man wipeth a dish, wiping it and turning it upside down," *is* more likely to destroy the science of a nation than to inaugurate it.

The science of a nation could hardly fail to go down in ruin under such a catastrophe. The life of its religion was more deep seated and survived. The Jews came back from exile devoted to two things—to monotheism, and to the observance of the Sabbath. The first they had possessed before the overthrow, but had held it lightly until they had learned devotion to it in the furnace of affliction. Had they possessed the Sabbath also before their captivity? Or had they learned it from their conquerors, as some now assert that they did?

Not from their conquerors. For whilst the Babylonian week and Sabbaths were dependent strictly upon the lunar month, and were therefore astronomical, the Jewish week was a "free" week, independent of month or year; that is, of any natural division of time. And history shows us that it has been the Jewish week that has had the power of asserting itself, not the Babylonian. No other race adopted from the Babylonians their week or Sabbaths; but the Jews, though conquered and enslaved, succeeded in imposing, to no small degree, the observance of their Sabbath, both upon the Greeks and the Romans. Indeed, the week, both of the Christians and of the Mahommedans, is derived directly from the Jews, though with a change of the day of observance.

Further, the Babylonian Sabbath differed from that of the Jews, not only by the manner in which its incidence was regulated, but also in the way in which it was observed. The Jewish Sabbath was a day of rejoicing and complete rest from work. The Babylonian was only marked in the ritual of court and temple; it was no day of general rest. This we know; for Professor Schiaparelli has examined the dating of nearly 3,000 Babylonian deeds and contracts, and has found that business was transacted as freely on the Sabbaths as on other days. The Babylonians could not possibly give to the Jews

that which they did not possess themselves, and they possessed neither the knowledge of One Only God, nor the observance of the seventh day of rest.

Turning now to the light which the astronomy of to-day can throw upon Scripture, we first note the significance it gives to many allusions. Thus St. John uses both the fall of a great aerolite or bolide, and a meteoric shower in his prophetic imagery. "There fell a great star from heaven, burning as it were a lamp," and "The stars of heaven fell unto the earth, even as a fig-tree casteth her untimely figs, when she is shaken of a mighty wind." The great Leonid meteoric swarm, which has afforded us the most striking displays in modern times, had probably not entered the solar system when St. John wrote, but some similar sight no doubt, suggested his simile. Joel and Amos refer to eclipses both of sun and moon, "The sun shall be turned into darkness and the moon into blood"; possibly having the tradition or recollection of the solar eclipse of B.C. 831, which occurred about midday in Judea. Modern meteorology illustrates quite a large number of passages, and these, taken together, show the Hebrews to have had a very clear and complete idea of the atmospheric circulation. Thus Elihu describes the process of evaporation :—

> "For God draweth up the drops of water,
> Which distil in rain from his vapour
> Which the skies pour down,
> And drop upon man abundantly."

Referring to the mystery of how it is that the clouds float, each in its own place, at its own level, each perfectly "balanced" in the thin air, he asks the significant question which we still have to leave without full answer :—

"Dost thou know the balancings of the clouds, the wondrous works of Him which is perfect in knowledge ?"

Astronomy comes into two or three of the Scripture narratives. In the case of the return of the shadow on the "dial of Ahaz," and in that of the Star of Bethlehem, we are obliged to conclude that the narratives are too incomplete—from the astronomical point of view—to justify any astronomical deductions. All that the science can do to help us—but this is not an insignificant matter—is to enable us to reject, as unsatisfactory, several explanations that have been suggested.

The case is different with the narrative of Joshua's "Long Day." Here I believe that I have myself been the first to analyse the narrative from an astronomical point of view, and the result is a striking one. Hitherto, the idea popular among critics has been that the chief incident was the result of a late and uncritical historian interpolating into an old chronicle a piece of poetic hyperbole from an old war ballad, and taking it literally. The astronomical analysis shows that this view is untenable. The chronicle and the ballad convey the same statement, but in such a different manner that it was impossible in those times to have inferred one from the other. Both the chronicle and the ballad, therefore, must have recorded an observed fact, and recorded it at the time. In no other way can their agreement be explained. That fact, if recorded in the language and from the knowledge of to-day would probably be expressed thus: "The Israelites marched between noon and sunset of that memorable day, a distance that it would have ordinarily taken them a full day to traverse." But recorded in the language and from the knowledge of the time it could only be given as we actually read it. "So the sun stood still in the midst of heaven and hasted not to to go down about a whole day."

It will be seen that in this case, and in two or three others, the astronomical point of view has not led me to the conclusions now most generally held by Biblical critics. I would not for one moment be understood as seeking to give this fact any disproportionate weight. I have no claim to any authority in Biblical criticism, except where my own science may incidentally touch upon it. But I would respectfully offer these few remarks as suggestive of a possible line of enquiry that has hitherto been neglected, but may be made fruitful in the future.

Of all the points in which modern astronomy has illustrated Scripture, none are so striking as the knowledge which it has brought to us of the numbers and the distances of the stars. Scripture uses the stars as the example of limitless number. "Look now toward heaven, and tell the stars, if thou be able to number them": "As the host of heaven cannot be numbered." Scripture uses the distance of the stars as the example of limitless space. "Is not God in the height of heaven? and behold the height of the stars, how high they are": "For as the heaven is high above the earth, so great is His mercy toward them that fear Him."

What a fulness of meaning these references to the number and

height of the stars, have in the light of the astronomy of to-day. The star catalogue of Hipparchus contained a little over 1,000 entries; the great International Photographic Chart will show the images of more than 50,000,000 stars. There are photographs in existence showing upwards of 100,000 stars on one single small plate; and no one believes that we have reached the limit in any direction.

So with their distances. By using the enormous base line of the diameter of the earth's orbit—186,000,000 of miles—we have been able to get a hint of the distances of some 40 or 50 stars; all the untold millions beside are, as yet, beyond our reach.

And the nearest of these stars, where is it placed? If we represent this vast globe on which we live by a single pin-point, a hundredth of an inch in diameter; if we place an inch marble, 9 feet away, to represent the sun, we then should have to travel to Liverpool before we should be able to indicate the place of our nearest neighbour amongst the stars. Nor have we come across any token of the end; we can put no limit to the extent of the universe of stars.

Has the progress of science rendered inappropriate or obsolete these two Scripture illustrations of limitless number and of limitless space? Has it not rather furnished them with superlative justification?

I said early in my Address that in one sense the Bible had nothing to say respecting astronomy. I want to reverse that now. It has everything to say that is of vital importance. I do not know how large Job, David and Isaiah conceived the sun to be; they may possibly have thought it no more than 80 feet across. Anaxagoras of Greece rose to a bolder conception, and suggested that it might be as big as the Peloponnesus—80 miles across. We now know that it is more than 800,000 miles, and that it is only one out of many million suns, nor is it the largest of these; it has been argued that Arcturus may be 80,000,000 of miles in diameter.

Well, if so, if instead of being a fiery ball 80 feet across, the sun is really 800,000 miles or for the matter of that if it were 80,000,000 of miles, what difference does it make to the fundamental relation of man to the Creator on the one hand, and to the Creation on the other? Now from one end of the Bible to the other, no matter when its different books were written, where, or by whom, there is no faltering nor uncertainty in the teaching which it gives on this absolutely fundamental point. God is the Maker and Creator of all things; and Creation consists

of things, not of gods; man is the one creature that is made in the image of God, that has communion with Him on the one hand, and can examine into and appreciate the glories of the visible creation on the other.

Here we are dealing with the basis of all religion, with truth which is eternal, with a relation which does not change, and the progress of science cannot modify in its essence.

If the progress of science could alter this relation, could alter the fundamental basis of religion, what would follow? Necessarily that religion must be closed to all but the few. The poor, the ignorant, would have no part in it. It would be the monopoly of the few giant intellects which were at the head of the science of the day.

Of the science of the day, which the science of the morrow would make obsolete. For science deals with things that change and of their changes, and is the changing thought of man concerning these. But religion deals with that which is eternal and reaches all, even the poor, the ignorant and the young. Nay it is especially for these, for it is eternally true that unless we be converted and become as little children, we cannot enter the kingdom of heaven. The little child can apprehend as well as the wisest sage, the first article of religion:—

"I believe in God the Father Who made me and all the world."

That truth, whether so expressed, or expressed as in the first words of Genesis:—

"In the beginning God created the heaven and the earth,"

is the foundation of all science as well as of all religion. It cuts at the root of all animism, nature worship, and polytheism and of all the endless and degrading myths which have sprung therefrom, and have debased the spirit of man, and enslaved his intellect. That truth has set man free, free to examine into the whole wide creation without restriction and without fear; free also to glorify God and to enjoy Him for ever.

The Address was listened to with great interest, and the thanks of the Meeting for it were moved by the Very Rev. Dr. Wace, Dean of Canterbury, seconded by Rev. Chancellor Lias, and being put from the Chair by the President, were carried unanimously.

At the conclusion of the proceedings a cordial vote of thanks to the President for his conduct in the Chair was carried unanimously.

ORDINARY GENERAL MEETING

WAS HELD IN THE ROOMS OF THE INSTITUTE, ON MONDAY, DECEMBER 9TH, 1907.

LIEUT.-GEN. SIR H. L. GEARY, K.C.B., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed and the following candidates were elected :—

ASSOCIATE.—Rev. J. Abbot Winfield, Canada.

LIBRARY ASSOCIATE.—Rugby School Library.

The following paper was read by the Secretary in the absence of the author :—

PRIMEVAL MAN IN BELGIUM.

By Rev. D. GATH WHITLEY.

1. *Esquisse Géologique du Nord de la France, et des contrées voisines.* Par M. J. Gosselet. (Lille, 1903.)
2. *Explorations Scientifiques des cavernes de la vallée de la Mehaigne.* Par Julien Fraipont et F. Tihon. (Bruxelles, 1889).
3. *La Race Humaine de Néanderthal ou de Canstadt en Belgique.* Par Julien Fraipont et Max Lohest. (Paris, 1886.)
4. *L'Homme pendant les Ages de la Pierre, dans les environs de Dinant-sur-Meuse.* Par E. Dupont. Deuxiéme Edition. (Bruxelles, 1873.)

THE Antiquity of Man is a subject which has come prominently to the front during the last fifty years, and the interest excited by it shows no sign of diminishing. Since Sir Charles Lyell wrote his classical work* dealing with the question, many able geologists have investigated the matter, both in England and on the Continent, as well as in America; and in no country have more important results been obtained than in Belgium. Notwithstanding its insignificant size, Belgium has played a most important part in the history of Europe, and its testimony to the Antiquity and Condition of

* *The Geological evidences of the Antiquity of Man.* 1st Edition, 1863.

early Man is of such a valuable character, that geologists from all countries have always considered that it is necessary to visit Belgium and confer with its geologists before they are fully qualified to come to definite conclusions relating to the age of Man upon the earth. Sir Charles Lyell himself thought it necessary to visit Belgium before he discussed the antiquity of Man in the light of the discoveries which had been made in the gravel beds of the valley of the Somme.*

The great importance of Belgium in questions relating to Primeval Man, is determined from two striking facts. The first is that it contains a wonderfully perfect series of the Quaternary deposits. These beds of sand, clay and gravel, which were formed after the appearance of Man upon the earth, are spread out in Belgium over a vast extent of country, and are therefore easily examined. In addition to this, the limestone rocks of Belgium are full of caverns, which contain the remains of the great extinct mammalia, and also the bones and weapons of Man. No country in the world presents such a splendid series of bone-caves affording evidence as to the early condition of Man in Belgium. Professor Dupont himself has explored more than sixty caverns in seven years, and the Belgian geologists are prosecuting the work with the greatest skill and enthusiasm. From the time when Schmerling began to explore in a scientific manner the caverns near Liége in 1833, down to the present day, the work of investigation has been unceasingly carried on, and has yielded most valuable results.

According to M. Dupont, the oldest portion of the Quaternary formation in Belgium is composed of a thick bed of rolled pebbles, averaging in size a hen's egg, and immediately over the pebbly deposit, lie stratified sands and clays.† In this deposit are found quantities of the bones of the lion, hyæna, elephant, and rhinoceros. As a rule, this bed of pebbles is only found in the bottom of the valleys, and thins out on the lower slopes of the hills; here and there, however, it is found in patches on the uplands and on the plateaux,‡ where it contains the same fossils as characterise it in the bottom of the valleys. Next in ascending order, comes a vast deposit of yellow clay full of angular blocks, which covers hill and dale, and envelops the

---

* *Quarterly Journal of the Geological Society*, vol. viii, pp. 277–281.

† *Étude sur le Terrain Quaternaire des vallées de la Meuse et de la Lesse*, pp. 37–39.

‡ See the opinion of M. Rutot in *Bulletin de la Société Royale Malacologique de Belgique*. Tome xvi, 1881.

country like a gigantic winding-sheet. Over this, again, lies the Loess, an enormous deposit of calcareous clay, which is spread over every part of the country except the bottom of the valleys, and is also extensively developed in the valley of the Rhine. The most recent of the Quaternary formations in Belgium is a great deposit of sand, which is clayey towards the bottom, and shifting and movable near the surface, and which is known by the name of the "Campinian Sand." Now, all these different deposits belong to the same geological era, for they all contain the *same remains*; the bones of the lion, elephant,* hyæna, and rhinoceros, being found in all the beds, from the pebbly deposit at the bottom of the Quaternary series, to the Campinian Sand at the top. All, then, were formed, successively speaking, at the same geological period. Their thickness varies in different places, for it is rare to find all four members of the series present in the same locality. In the great delta, however, where meet the Rhine, the Escant, and the Meuse, Professor Gosselet tells us that the Quaternary deposits are more than 450 feet thick, on the borders of the Zuider Zee.†

Now, how were all these deposits formed, and what were the causes which operated to bring them into their present position, and to spread them out over such a large extent of country? Marine action is out of the question, for the animal remains found in them are nearly all terrestrial, being the bones of the great land mammalia, and such shells as are confined to the land and to fresh water. M. Dupont thinks that the deposit of rolled pebbles which come chiefly from the Ardennes, was formed by the rivers, cutting out their valleys, when they had a vastly greater volume of water, during the early part of the Quaternary Period. This view is, however, quite untenable, for the rolled Ardennaise pebbles are found not only in the bottom of the valleys, but also in patches on the tops of the hills where no rivers could have flowed. Another theory is, that this great pebbly bed is of glacial origin, having been formed by great floods occasioned by the melting of glaciers and ice-sheets, which ploughed out the land, as Belgium slowly rose out of the icy waters of the Glacial Sea. This theory is no better than the former. The Belgian hills were too low to support glaciers of any considerable size, and Professor Gosselet tells us, that all over North-Eastern France, where the Quaternary beds are the same as those in Belgium, no traces of any ancient glaciers

* The elephant referred to is always the Mammoth.

† *Esquisse Géologique du Nord de la France*, p. 3.

can be discovered.* Moreover, the hippopotamus and the mollusk *Cyrena fluminalis* lived in Belgium when the pebbly deposit was forming, and it is impossible to believe that glaciers and ice-sheets covered the country at the time when these inhabitants of warm countries abounded in its rivers. The yellow clay with blocks, is spread all over Belgium, on the hills and in the valleys, and owes its origin to some great and general cause, acting all over the country. Ice is excluded from the reasons just stated, which apply with similar force to the Loess, the distribution of which is as widespread and universal as that of the yellow clay. It has been suggested by many theorists, such as M. Dollfus,† and Professor James Geikie,‡ that the Loess was formed by vast floods which swept over Northern Europe when the great ice-sheets formed during the Glacial Period were rapidly melting; but here again it is clear that such inhabitants of warm climates as the hippopotamus and the *Cyrena fluminalis* could not have lived amidst ice-sheets and frozen rivers.

It is certain that water spread out these great beds of sand and clay, which enwrap Belgium like a vast mantle, and when these deposits were laid down the climate must have been mild and warm. The late Duke of Argyll has acutely pointed out,§ that every great flood leaves as its result, three kinds of deposits, clay, sand and gravel, and that great stones and boulders are rolled along by the tumultuous waters and dropped in all situations. This is exactly what we find in Belgium and Northern France; and as these deposits of sand, clay and gravel, of the Quaternary Period, contain the bones and flint weapons of Man, we are justified in concluding that at the close of the Quaternary Era an extensive flood poured its waters over Northern Europe, drowning the great mammalia and overwhelming Man. This is the theory held by M. Dupont, and it is also the opinion held by MM. Tardy, d'Acy, and Belgrand in France, by the late Sir Joseph Prestwich, and Sir Henry Howorth in England. If this idea is correct—and all geological evidence is in its favour—it proves that the Quaternary beds were formed rapidly. It also indicates that, as these deposits contain the bones and weapons of Man, any attempt therefore

---

* *Esquisse Géologique du Nord de la France*, pp. 3, 10.

† *Bulletin de la Société Géologique de France.* Tome vii, Fevrier, 1879, p. 325.

‡ *Prehistoric Europe*, p. 162.

§ *Geology and the Deluge*, pp. 21, 22.

to prove the great age of the human race, by assuming the *slow* formation of these deposits, is not to be depended on.

M. Dupont's work,* although lengthy, is divided into only seven chapters. It is well illustrated with maps and tinted engravings, one of which represents the almost perfect skeleton of a Mammoth, found in the province of Anvers in 1860, and now in the museum at Brussels.

The first two chapters are merely introductory, but the third introduces the reader to the subject, because in it M. Dupont discusses the nature of the Quaternary climate, in which geological era, Man first appeared on the earth. At that time M. Dupont thinks that the greater portion of the desert of the Sahara was submerged beneath the sea, which gave rise to moisture-laden winds, and, at the same time, in the North, the sea rolled over Northern Germany, Denmark, and Holland. Thus Western Europe was surrounded by vast expanses of water, which made its climate far more humid than it is now. The summers were mild, the winters warm, and there were no extremes of heat and cold. The rains were tropical in their violence and duration. The rivers were of immense size, rolling along an enormous volume of water, and constantly swollen by tumultuous floods. A luxuriant vegetation clothed the hill-sides and covered the lowlands, mantling the slopes with great forests, and filling the valleys with dense jungles. Along the banks of the rivers and amidst the waters, lived the wild boar, the rhinoceros, and the hippopotamus, whilst the tyrants of the woods were the lion, the leopard, and the hyæna. The elephant roamed amongst the forests, the bear, elk, and musk-ox wandered over the uplands, and troops of wild horses, buffaloes, and reindeer, grazed on the grassy plains. Such was the aspect of Belgium in the Quaternary Period, when Man made his dwelling in the caverns in the limestone cliffs which overhung the waters of the Lesse and the Meuse.

M. Dupont begins his account of Primeval Man in Belgium, by describing the caverns of the Mammoth Age, which he considers to be the earliest part of the Quaternary Period The caves he first notices are near Montaigle in the valley of the Molignée, and are called *Trou de l'Érable*, *Trou du Chêne* and *Trou du Sureau*. They are filled with fluviatile loam, and contain the bones of the horse, bear, reindeer, rhinoceros, and elephant. In the midst of these are cinders of fires, and human weapons of bone and flint. These last are formed from a flint

* *L'Homme pendant les Ages de la Pierre.*

found only in Champagne, which proves that the men who in those far-distant days hunted the lion and other animals were active hunters. But of all the rock-dwellings described by Dupont, the cave of Goyet is the most interesting. A little rivulet, called the Samson, enters the Meuse near Namur, and on its banks, near the village of Goyet, is situated the cavern.* It contains *five* distinct bone-beds, which are packed full of animals' remains. The number of bones, skulls, and teeth is perfectly amazing, and almost every animal of the fauna of Western Europe at that time is represented. In one bone-bed alone, the skeletons of four lions were found lying side by side. The largest skeleton, which was almost perfect, has been restored and set up for public inspection: it measured 4 feet in height at the shoulder. The other animals whose remains were in the cave were the elephant (Mammoth), horse, reindeer, wolf, buffalo, hyæna, and rhinoceros, and in addition to these, the bones of the bear were wonderfully abundant. Lying amidst the remains of the hyænas were human bones, as if Man himself had been devoured by these ferocious animals. Flint weapons were strewn about, and a necklace of shells, some of which must have been brought by trade from Rheims in Champagne, was also discovered. The other relics of Man were a bone harpoon of reindeer horn for spearing fish, curiously barbed on both sides, and a curved bone dart also made from the antler of a reindeer. Still more interesting than these relics was a bone instrument, similar to those found by MM. Christy and Lartet in the bone-caves of the Dordogne in the south of France, and called by them "Batons of Command."† They are supposed to have been the sceptres of chiefs: this is the first that has been found in Belgium. It was smoothed, and pierced with a hole at the larger end, and the figure of a fish was sculptured on one side, and on the other a branch of a tree with leaves was engraved with wonderful skill. The valley of the Lesse, which flows into the Meuse near Dinant, presents a fine series of limestone cliffs, which rise high above the river, and are full of caverns. Of those of the Mammoth Age the *Trou de la Naulette* is the most important. Dupont found that it contained six beds of stalagmite, beneath which, in sand and clay, lay the remains of hyænas, and of the bones of animals

* There are three caves at this place; the most important is described here.

† Many of these are figured in the coloured plates of *Reliquiæ Aquitanicæ*.

gnawed by them, showing that the cavern was a hyænas' den. A human jaw, of a strange character, lay with the bones.* It was declared to be of a brutal form, and almost ape-like in its peculiarities. M. Hamy, however, has proved that this was a mistake, and that it is merely an abnormal member of a series of human jaws. He also has shown† that it resembles the jaws of many Melanesians now living, so the idea that its possessor was in any way ape-like, must be abandoned. In *Le Trou Magrite*, a cavern in the valley of the Lesse, there lay amongst the bones of the Mammoth, reindeer, hyæna, and rhinoceros, a part of a small human figure carved in reindeer horn, apparently representing a woman. Near it was found a portion of a sceptre of reindeer horn, ornamented with lines and dots, and some fragments of pottery. This last discovery shows that many geologists have fallen into serious error, when they have maintained the Primeval Man in the Palæolithic Age was ignorant of pottery. The fact is that pottery has now been found in many caverns of the Palæolithic Period, both in France and in Belgium, although in England none has as yet been found. M. Fraipont gives a list of the caves in Belgium belonging to the *earliest* or Mammoth Age‡ in which pottery has been discovered, specially mentioning the caves of Spy, Engis, and Le Petit Modave. This assumed ignorance of pottery by Primeval Man is, therefore, one of those errors which must be abandoned.

We may now ask, "What kind of men were they who hunted the elephant and rhinoceros, lighted their fires, and made their repasts in the caverns amongst the cliffs overhanging the Belgian rivers"? The first reply to this question is furnished by the Engis skull. This remarkable relic was discovered by Dr. Schmerling about seventy years ago, in one of the Engis caverns in the valley of the Meuse, not far from Liége. It lay amidst the bones of the bear, hyæna, elephant, and rhinoceros, in a bed of loam and pebbles, which was formed at the same time as the oldest deposits in the caves of Naulette and Goyet. Its immense age is undoubted, and Dr. Martin Duncan has declared§ that it and the Naulette jaw were the oldest human remains in Europe at the time he wrote. The

---

* Some teeth and two human bones were found with the jaw.
† *Précis de Paléontologie Humaine*, pp. 233, 234.
‡ *Revue d'Anthropologie, Juillet*, 1887.
§ *The Student*, vol. iv, p. 259.

skull is figured by Sir Charles Lyell,* who quotes Professor Busk's opinion that it could be compared with the skulls of modern Europeans.

Professor Huxley also says of it: "There is no mark of degradation about any part of its structure. It is, in fact, a fair average human skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage."† The earliest men in Europe were therefore as well provided with brains as are the modern Europeans, and they possessed faculties for using them as powerful as those of the Belgians of the present day. Franec gives precisely the same testimony, for one of the oldest skulls found in that country is known as the skull of La Truchère, the possessor of which lived with the lion and the rhinoceros. This splendid skull has a cranial capacity of 1,925 cubic centimetres,‡ whereas the average cranial capacity of the modern Parisians is only 1,558 cubic centimetres. Many primeval men, therefore, were much better provided with brains than are their successors in France to-day.

M. Dupont devotes his next chapter to a lengthy description of the men of the Reindeer Period in Belgium. This he considers to be the later part of the Quaternary Era, when the Mammoth had disappeared from Belgium, and the reindeer had become very abundant. But as the Mammoth still lived in England and France, this classification is merely a matter of convenience, and applies to Belgium alone. Both the Mammoth and the rhinoceros lived with the reindeer right down to the end of the Quaternary Period.

The principal caverns belonging to the Reindeer Period are those at Furfooz in the valley of the Lesse, not far from Dinant, and the most interesting of these is the cave of Frontal. In this cavern there was, at the end, a little sepulchral chamber, evidently of natural origin, and in it lay the remains of sixteen human skeletons, the bones of which were mingled in the greatest confusion. Fragments of a large earthenware urn, which had a round base and holes at the sides, lay with the skeletons. This evidently was hung from the roof of the sepulchral chamber, and probably contained provisions for the dead. Two plates of sandstone were found near by, one covered with strange markings which may have been intended

---

* *The Antiquity of Man*, p. 81.
† *Man's Place in Nature*, p. 156.
‡ *Hommes Fossils et Hommes Sauvages*, by M. de Quatrefages, p. 77.

to signify the number of warriors slain by the chiefest man buried in the chamber, and the other was marked by the figure of some animal. The skeletons were mixed up pell-mell, but evidently the bodies had been buried with care, having been reverently laid one above the other. The entrance of the vault had been closed by a great slab of limestone, which exactly fitted the opening, and had been forced out of its place by a great deposit of yellow clay which filled the cavern almost to its roof, burying all the relics. Outside the cave, beneath a mass of sand and gravel, were charcoal, cinders, and animals' bones, which were probably the remains of funeral feasts held in honour of the dead.

This most interesting cavern reveals to us several important truths concerning Primeval Man, who inhabited the rock-shelters on the banks of the Lesse in the days of the Mammoth and the reindeer. First, from the nature of the skeletons, we learn the character of the men who were buried in it. They were rather below the mean height; possessed a Mongolian or Tartar-shaped head with a somewhat brachycephalic skull, differing in this manner from the type of men who are represented by the Engis skull to which we have just referred. The brains, however, of the men buried in the cave of Frontal must have been of a fairly average size. Next we learn that the Troglodytes of the Lesse buried their dead with care and reverence, a fact which has been denied by those who are imperfectly acquainted with the customs of the men of the Palæolithic Period. Thirdly, we mark there spect which these earliest men had for the dead, for they carefully closed the opening of the sepulchral chamber with a large stone slab to keep the bodies safe from wild beasts, evidently cherishing the memories of the departed with sincere affection. Lastly, it is demonstrated that these primeval inhabitants of Belgium held the ennobling belief of Immortality.

The cave of Chaleux, in the cliffs overhanging the Lesse not far from Furfooz, is equally interesting. A mass of stones had fallen from the roof, and in the rubbish which lay upon them, which in its turn had been covered with a second fall of stones, were the relics of human occupation of the cavern. Charcoal, cinders and animals' bones, together with weapons of bone and stone, were all wonderfully abundant, no fewer than 30,000 splinters of flint alone being collected from this dwelling among the cliffs. A bone needle, with a well-formed eye, was one of these relics, and it had evidently been used for making garments of skin. This raises the question of the dress of

Primeval Man. That there were naked savages in these remote times is, of course, certain, just as there were in Northern Europe in the palmy days of the Roman Empire.* But the men who frequented the caverns of France, England and Belgium, and who fought with the lion, the elephant, and the rhinoceros, were well clothed. The numerous bone needles, with well-drilled holes, which have been found in the caves of the Dordogne in Southern France, in Kent's Hole near Torquay,† and in the caves of Cresswell Crags in Derbyshire,‡ all witness to the existence of the tailor's art in primeval days. Roughly formed flints known as "scrapers" are common in nearly all the caverns in great numbers, and were doubtless used then, as they are now, by the Eskimo,§ in cleaning the skins, which were designed for garments. Professor Boyd Dawkins even maintains, from the discovery of a carving on a bear's tooth in the Duruthy cave in the Pyrenees, that the men of the early Stone Age‖ wore gloves![¶] But this is not all. In the recent discoveries carried on in the cave of Brassempouy in Western France, by MM. Piette and Laporterie, carved statuettes were found of the greatest antiquity, and which showed that the earliest men wore dresses of *cloth* with tippets, and drawers confined at the waist with girdles, while their heads were covered with cloth caps, after the manner of the ancient Egyptians.** It is certain, therefore, that highly cultured races existed in those far-distant times, and the idea of a universal state of primitive human barbarism must be abandoned.

A vast number of ornaments lay among the human relics in the cave of Chaleux. These were shells pierced for necklaces, small fragments of bright minerals, and miscellaneous gems for trinkets. Many of these had been brought from great distances, such as certain flints and fossil shells, which could only have been found near Paris and in Southern France. How came these foreign substances into Belgium? M. Dupont thinks

---

* The reader will recollect the description which Tacitus gives of the wretched state of the Fenni. *Manners of the Germans*, c. 46.

† *The Ancient Stone Implements of Great Britain*, by Sir John Evans, 2nd Edition, p. 506.

‡ *Ibid.*, 524.

§ *Prehistoric Times*, by Lord Avebury, 6th Edition, pp. 89, 90.

‖ *i.e.*, the Palæolithic Period.

¶ *Early Man in Britain*, *p.* 211.

** *Bulletins de la Société d'Anthropologie de Paris*, Novembre–Décembre, 1894.

that traders were in the habit of conveying them from the banks of the Loire and the Seine to the cave-dwellers of the Belgian rivers, and he refers to the case of a tribe of South American Indians, who, according to MM. Roulin and Boussingault, traded in stones for implements with the natives who inhabit the marshy banks of the Orinoco. He is probably correct, and this proves how extensive were the commercial relations of the earliest men. In Southern France we find precisely the same thing; for the caves of the Dordogne contain numerous fragments of bright minerals, shells and amber, which were used as ornaments and must have been brought, some from the Atlantic and some from the Mediterranean coast of France, and some from regions still more distant.*

It would appear, therefore, to have been in the days of the Mammoth and rhinoceros, an elaborate system of trade amongst the earliest men in Western Europe. Trade, barter and exchange, were carried on over vast areas, and a complicated commercial system was in operation all over France, and the low countries to the north, similar to that which prevailed in North America previous to the Spanish conquest. M. Dupont maintains also, that as Western Europe was at that time covered with dense forests full of wild and savage beasts, the trade between Belgium and Southern France must have been principally carried on by means of the rivers, then much larger than now. These were navigated by the indefatigable traders of primitive times by means of rafts and canoes. All these discoveries strongly establish the high intellectual character of Primeval Man. How can we for a moment believe that the men who possessed such splendid skulls, and such large brains; who dressed in cloth and carefully-prepared skins; who adorned themselves with paint, necklaces and ornaments, and who reverently buried their dead in the belief of a life beyond the grave, were brutal and degraded savages? The idea is impossible.

Efforts have been made to identify the cave-men of France and Belgium with races now living, but the attempts have not been particularly successful. M. Dupont considers that the Troglodytes of the Lesse were of the Mongolian race and allied to the Eskimos, but that the family is extinct. Professor Boyd Dawkins goes much further, and actually *identifies* the cave-men with the present Eskimo,† causing them, in his

* *The Human Species*, by M. de Quatrefages, p. 326.
† *Early Man in Britain*, p. 242.

argument, to retreat at the close of the Palæolithic Period into the arctic regions of Asia and America. The reason for this identification, although plausible, seem to be somewhat precarious. They consist of the character of the bone harpoons, of the stone scrapers, and of the carvings and sculpturings, and they are certainly suggestive, so much so that M. Girod in his recent work,* accepts Professor Boyd Dawkins' theory, and the resemblance between the two races had been already suggested by MM. Christy and Lartet.† If this be true, it is another proof of the high intelligence of Primeval Man, as all who have lived amongst the Eskimo bear witness to their intellectual capacity, and to their marvellous ingenuity. Their hunting and their fishing, their snow houses and their stone huts, their boats and their sledges, their cleverly-formed darts, arrows, and harpoons, mingled with their wonderful artistic ability, all combine to place the Eskimo in the front rank among the uncultured races of living man. If Primeval Man was indeed of the same race as these denizens of the arctic regions, he must have possessed an intellectual capacity of the very highest character.

We turn now to the work of MM. Fraipont and Lohest, which describes the cave-men found in the cavern of Spy, not very far from Namur. This cave is situated on the slope of a wooded hill above the little stream of the Orneau, and has been subjected to a thoroughly scientific exploration. The animal bones found in it belonged to the Mammoth, the rhinoceros, the hyæna, the cave-bear, the lion, the horse, wolf, and the sheep. Along with the remains of these animals were found the bones of two human beings, the skeletons of which, although by no means perfect, were sufficiently complete to give an admirable presentation of the character of the individuals to whom they belonged. The skulls were in fairly good condition, and belonged evidently to the same race. Both were dolichocephalic although slightly differing from each other. The skeletons belonged to a race of men somewhat below the middle height, thick set, with a receding brow and an ape-like retreating chin. The teeth of these primitive men were well preserved, and resembled those of modern savage races of a low character. With the animal remains in the Spy cavern lay some fragments of rude pottery, which have caused M. de Mortillet to doubt

---

* *Les Invasions Palæolithiques dans l'Europe Occidentale*, pp. 77, 78.
† See *Reliquiæ Aquitanicæ*.

the antiquity of the human remains,* but there seems to be no reason for refusing to give to these human skeletons a high antiquity. Pottery was extensively used in the Palæolithic Period, although none has as yet been discovered in England in any deposit which is known to be of Palæolithic Age.†

These skeletons from the Spy cavern are taken as typical of the Neanderthal or Canstadt race, the men of which lived in the First Stone Age. In the Palæolithic Period there were (so anthropologists tell us) four distinct races of men, characterised principally by the different shape of their skulls. *First:* the race of Canstadt, the men of which had dolichocephalic heads, low and receding foreheads, retreating chins, and a short stature. *Secondly:* the Cro-Magnon race, also dolichocephalic, but the men of this race were tall, and had finely-formed frames. *Thirdly:* the race of La Truchère, which is known to us by only a single skull, which is of a very fine character, and brachycephalic. *Fourthly:* the Furfooz race, which occupied a somewhat intermediate position, as the men belonging to it were rather short, and had heads of a brachycephalic character, as is well shown by the character of the human remains found in the cave of Frontal.

Now, it has been argued that, of these races, the Canstadt race was the oldest, but the assertion cannot now be shown to be correct. As Fraipont and Lohest have proved, the age of the skeletons found in the Spy cavern is undoubtedly very great. But the other races, with, perhaps, the exception of that of Furfooz, go back quite as far. We have already referred to the skull of La Truchère, and we have shown what a high character it possesses, and this skull is quite as old as the skeletons of Spy. Then, again, take the case of the race of Cro-Magnon, the fine skull of Engis, with its large brain case, has an antiquity quite as great as that possessed by the Spy skeletons. These three races, therefore, evidently lived side by side in Western Europe at the same time.

But, even if we assume that the Canstadt (or Neanderthal race) was the oldest, we have still to ask if the skulls and bones of that race indicate necessarily a low mental condition. All geological research answers this question in the negative. The famous skull of Neanderthal which (with other human

---

* *Formation de la Nation Française*, pp. 286, 287.

† The pottery of the Palæolithic Age is well described by M. Fraipont in his paper *La Poterie en Belgique à l'Age du Mammouth*, which was published in *Revue d'Anthropologie*, 3me série, t. 11. Paris, 1887.

relics) was found in a cavern near Dusseldorf in 1857, is always taken as the principal type of the Canstadt race. What story has it to tell? It is easy to quote the words of Professor Huxley, who declared that it was the most ape-like skull he had ever seen. But there are other scientists who have expressed opinions directly contrary to this statement. M. Pruner Bey thought that the Neanderthal skull belonged to an idiot. Rudolf Wagner stated that it might have been possessed by a modern Dutchman. Von Mayer maintained that it was probably the skull of a Cossack who was killed in the Napoleonic wars in 1813 or 1814![*]

We have first to consider the size of the brain which this skull—the Neanderthal—contained. Unfortunately, only the upper part of the skull was found, so that the calculations were uncertain. It has, however, been estimated that the cranial capacity of the Neanderthal skull, when perfect, must have been at least 1,220 cubic centimetres. As this is as large as many Malay skulls, and even *larger* than many of the skulls possessed by the ancient Peruvians, it is clear that the men of the Canstadt race were possessed of brains quite as large as those owned by intelligent human beings of the present day. Doubtless the form and details of the skulls of Spy and Neanderthal, and of others which are typical of the Canstadt race, are rude and brutal. But de Quatrefages shows† that the skulls of the Scottish hero, Robert Bruce, of a bishop of Toul in the fourth century, and of a celebrated Danish politician of the seventeenth century, are all remarkably like the much-abused Neanderthal skull! All these facts show that there is nothing essentially brutal in this celebrated skull. According to Professor Huxley, it is much like the skulls of the Australian natives in the province of Victoria.‡ The black Australoid race, according to the same eminent anthropologist,§ is extended from Central India to Australia, and many scientists now hold that this race was identical with the Canstadt men of primeval days.‖ We know that the intelligence of the native Australians has been very much underrated, and their skill and ability are now known to be considerable. They easily learn

* *La Race Humaine de Neanderthal*, p. 95.

† *The Human Species*, pp. 309, 310.

‡ *Natural History Review*, 1864.

§ *Report of the International Congress of Prehistoric Archæology*, 1868, pp. 94, 96.

‖ *Les Invasions Paléolithiques dans l'Europe Occidentale*, par M. P. Girod, pp. 17–35.

to read and write English. They can play chess, and work the electric telegraph, while in Queensland their skill is so great that they are enlisted as police. Even in their savage state they are skilful in painting and drawing, and their manners, when kindly treated, are generally found to be good and intelligent.* If the men of the Canstadt race, whose remains were found in the Spy cavern, were allied to the Australians, they were *genuine men*, possessing all true human capacities, and capable of unlimited progress and development when placed in favourable circumstances.

Fraipont and Tihon have given to the scientific world an interesting and valuable account of the Doctor's cavern in the valley of the Rona, a tributary of the Mehaigne.† This cave they declare has been filled with detritus from the plateau above, carried into the cavern through an opening in the roof. This gives a caution to geologists not to always assume that the beds of gravel and sand found in caverns in valleys were necessarily introduced by rivers. Numerous implements of bone and stone were found in the cavern. Amongst the latter were many flint *scrapers*, which were used by the Troglodytes in preparing skins for clothing. The most striking thing, however, connected with the Doctor's cavern is that it contained *two* distinct bone-beds full of the bones of wild animals. Now, Fraipont and Tihon maintain that *all* these bones were brought in the cave by man, and that they are the remains of those animals which he killed in hunting or ensnared by stratagem. There are *several thousands* of débris of animals' remains in the Doctor's cavern, which belonged to at least 250 individual animals. In the lowest bone-bed the leading animals represented are the elephant (*i.e.*, Mammoth), the rhinoceros, the megaceros, the lion, the cave-bear, the urus, the horse, hyæna, and wolf. In the second bone-bed the largest animals whose bones were present were the lion, bear, urus, bison, and hyæna. All these animals had been killed by man, cut up outside the cave, and their heads and limbs brought within the cavern to form the feasts of the Troglodytes who fed upon them.‡

---

* See an article on the native Australians by the Hon. J. Mildred Creed in *The Nineteenth Century and after*, January, 1905.

† *Explorations Scientifiques des cavernes de la vallée de la Mehaigne.*

‡ The statement in this paragraph seems open to much doubt. It is hard to believe that there were the remains of 250 individual animals, and that they were all brought into the cave by men. The presence of the hyæna suggests that the cave may have been "a hyæna den."—Ed.

Now, let the question be asked, How was Man able to kill these gigantic animals? All the weapons that Man at that time possessed were of flint and bone of the rudest character conceivable. At the end of their book, Fraipont and Tihon give a series of plates in which are figured the rude flint weapons used by Primeval Man in Belgium. Yet with these miserable weapons the men of those early days boldly attacked and conquered the huge beasts above enumerated. Doubtless man set snares, traps, and pitfalls for the elephant and the rhinoceros, and by doing so he showed his intelligence and resource.

All this indicates that the earliest men were as *truly human* as are the cleverest savages of to-day. The men who, with the rudest stone weapons, hunted the Mammoth, the lion, and the still more terrible sabre-toothed tiger,* were possessed of human faculties, and were truly giants in skill and courage.

The north-eastern portions of France are overspread with superficial deposits of Quaternary Age, precisely resembling those of Belgium, as is clearly set forth by Professor Gosselet, of Lille, in the work the title of which appears at the head of this article.† Gosselet has done most valuable geological work in France, and so highly has that work been appreciated in this country, that in 1882 he was awarded the Murchison gold medal by the Geological Society of London. He traces the great beds of sand, clay, and gravel, which cover so large a portion of Belgium into France, and shows that in all their main features they are similar. His first seventeen pages are introductory, and he then proceeds to describe the Quaternary beds of Northern France in detail. After a close study of the elaborate description given by the talented French geologist, the reader comes to the following conclusions. The whole of North-Eastern France is covered for thousands of square miles with enormous deposits of clay, sand, and gravel. These beds are found sometimes in the valleys, sometimes on the slopes of the hills that border them, and sometimes on the tops of the table-lands. The deposits of which we speak were all formed at the *same time*, geologically speaking, for they all contain the bones of the *same animals*, which are, the lion, hyæna, elephant, rhinoceros, and hippopotamus. How were these vast deposits of clay and gravel which cover the country formed? Gosselet declares that he cannot tell, for, according to him, only in the bottom of the valleys is fluviatile action discernible, whilst he

* The *Machairodus*.

† *Esquisse Géologique du Nord de la France.*

states that the origin of the extensive deposits which cover the uplands is unknown. The problem, however, is not altogether hopeless of solution. It is said by many able geologists* that the vast gravel beds are of fluviatile origin, and were deposited by rivers. But no rivers could have ever flowed along the tops of the hills, and over the surface of upland plateaux, and across watersheds, and in all these situations we find the same beds of gravel as are discovered in the valleys. In Northern France also there are numerous *dry valleys* where no rivers ever run or ever have run in the memory of man, and yet, in these dry valleys there are to be found exactly the same beds of gravel as may be seen in the great valleys through which rivers now flow.† The same cause which produced the gravels in the dry valleys may have formed them in the genuine river valleys. Further, we have to take into consideration the following remarkable fact. All the gravels in the valleys contain numerous bones of extinct mammals, and frequently *entire skeletons* have been discovered in these gravel beds. In the dry valleys, also, the bones of the same animals occur in the gravels. In the deposits of gravel all over France, similar phenomenon have been again presented. Now, how came the bones and skeletons of these great beasts in these gravels beds? We are told that the animals were washed into the streams and rivers, and drowned, but let us see what this statement implies, as such animals are rarely swept away by the ordinary river floods in Africa. Such a thing is rare, for these animals are too wary to be overwhelmed. Whence came the water to form these extensive floods? How could small streams suddenly swell to such an extraordinary size, that they were able to submerge these animals? The only rational solution of the problem is, that at the time when the Quaternary gravels were formed a tremendous *Flood* swept over Northern Europe, by which Man and the great mammalia then living were overwhelmed and swept away.

Here we close our notice of Primitive Man. The authors whose works we have followed are able and trustworthy. Their writings are most valuable, and to all students of the primitive condition of Man we most earnestly commend a study of the Quaternary deposits and the bone-caves of France and Belgium.

---

* Such as Sir Charles Lyell, Sir John Evans, and Lord Avebury.

† An extensive depression and submergence of the land took place after the "Glacial Period" in Britain and parts of Western Europe, and it is to this period the formation of the "high-level" gravels is, in all probability, to be referred.—Ed.

Discussion.

The Secretary (Professor Hull, F.R.S.), in moving a vote of thanks to the author for his important and interesting paper, said: I shall confine my remarks to the physical aspects of the subject. The period in the world's history to which the paper referred was perhaps the most critical and far-reaching of the great periods in geological history, as to it is referred the first appearance of Man. It did not follow that because Man, as represented by his works and remains, first appeared in the Pleistocene gravel beds and caves of Belgium, that he had not been long before an inhabitant of some other part of the world, probably in the Euphrates Valley or that of the Nile; but his appearance in Belgium and Western Europe was strictly defined as subsequent to the close of the Glacial Epoch. The earliest of the deposits described by Mr. Whitley was probably "the Loess" or glacial mud, formed by the melting of the vast deposits of snow and ice of the Glacial Period from off the Alps. These deposits, which partially line the Rhine Valley, contain no human remains, though bones of *hippopotamus* occur. The climate, which had been Arctic in character during the Glacial Period, was now becoming warmer owing to the gradual lowering of the land from its preceding high elevation; in fact, "the Pluvial Period" had set in, and rivers took the place of glacier ice; and as the land, in the succeeding epoch, gradually rose by successive stages, the deposits of river gravel were formed on the flanks of the valleys. It was now that Man seems to have appeared, and with him the animals of the Quaternary Period, so graphically described by the author.

The caves in the Carboniferous and Devonian limestones of Belgium were in all probability formed by subterranean rivers during (in part) the Pluvial Period. As the land rose, they became dry, the waters having either dried up, or found other channels, and thus became the abode of primeval men, or of the cave lion and hyæna. The Pluvial Period was of long duration, and is largely accountable for the flooding of the plains and low-lands of Western Europe. The geological phenomena of Belgium are represented in England, except that we have no representation of the Loess; but I

cannot agree with the author in supposing that at the Quaternary Period "a tremendous flood swept over Northern Europe, by which Man and the great mammalia then living were overwhelmed and swept away." The drowning of wild animals in rivers or lakes is quite an ordinary event in nature.

Rev. A. Irving, B.A., D.Sc.—I am sure we all thank the Rev. D. Gath Whitley for the able and comprehensive manner in which he has presented a summary of recent researches on Primeval Man in Belgium during the last quarter of the nineteenth century. The most valuable parts of the paper are, to my mind, those descriptive of the bone-caves and the cave-men, with comparisons drawn between some of the cave-men and the modern Eskimo, and between others and the Australian aborigines. In the former case it seems likely that human beings of such a type may have existed in Belgium and Northern France at the time even of the extreme glaciation of Northern Europe, when the southern limit of the great inland ice-spread appears to have been along a line roughly drawn through the mouth of the Thames, the mouth of the Rhine and Westphalia. A difficulty presents itself in the appearance of remains of great beasts of warmer regions along with those of the reindeer and other animals of high northern latitudes. It would almost appear that such an intermingling of a northern and southern fauna might be accounted for by the former animals being driven southwards by the advancing ice of the earlier Quaternary Period and mingled with such of those, now confined to warmer latitudes, as were able to adapt themselves to new conditions and so survived the increased severity of the climate. The thick hairy covering of the Siberian mammoth is a case in point.

In his able paper, Mr. Whitley has compared the results obtained by the Belgian explorers with those obtained by others in the South of France and in England. He would have added to the interest and value of his paper, had he extended that comparison a little to those obtained by German explorers, such as the Lindental Caverns near Gera, the Hohlefels of Achtal in Swabia (explored by O. Fraas), the Räubershöhle near Regensburg (explored by Zittel and von Dechen), not to mention others.

It may be of some interest to the members of the Institute to compare the results presented by Mr. Whitley with the following extract from the latest edition (1906) of Credner's *Elemente der*

Geologie :—"The great abundance of the articles of workmanship of Quaternary man and the remains of his hunting spoils which have survived to us, give a pretty clear picture of his civilisation and habits of life. The men were nomads and cave-dwellers of the lowest thinkable stage of culture; the use of metals was unknown to them, and for a long time even that of pottery ; their tools and weapons were originally only rough-hewn flints and coarsely-worked bones. Towards the end of the Quaternary Period a certain sense of beauty and of art in the production of carefully designed weapons and implements, of carvings and drawings on stone, ivory and antlers began to develop itself among them. Instead of cooking-vessels made of clay, the earliest men made use of slates and sand-stone slabs; agriculture was unknown to them, they lived by hunting, which they must have carried on very often in frightful conflict with the most powerful and gigantic representatives of the animal world with weapons of the most miserable description.

"The duration of the Palæolithic Period must have been of very great length, since at the commencement of the Neolithic Period, with the animal and vegetable world standing so nearly related to the present, the climatic conditions, and with them the inhabitants of the continent, have been transformed, and have become pretty much those of to-day."

All this seems to suggest that the more civilised cave-men of Belgium lived for the most part towards the end of the Quaternary Period. This point would receive some elucidation if Mr. Whitley could correlate the various articles of human workmanship with the successive layers of the cave-deposits, the existence of which he has noted in the case of the Goyet Cave.

We may find an explanation of the "Flood Period" by referring it to the later stages of the Ice-Age (the "jungdiluviale Steinzeit" of the German investigators, the "Magdalénien" of the French), with the melting of vast regions of land-ice, and of the widespread snow-fields, which must have accompanied it outside the limits of the ice itself. Further, if (as is probable) Britain was joined to the continent of Europe, while the North Sea was blocked by the confluent glaciers from Scandinavia and from Scotland (as the late Professor Carvill-Lewis has shown on his maps and in his writings), the waters of the land and ice-blocked German Ocean stood probably high enough to cover the low plateaux referred to in Mr. Whitley's

paper. This suggests an explanation of the widespread distribution of similar detritus over both the plateaux and the shallow intervening valleys; and M. Gosselet's problem (pp. 40, 41) would seem to be solved. The gravels which cap the higher hills (Mr. Whitley does not tell us that they contain Quaternary organic remains) may be much older; and their relation to the present valleys and lower uplands may, by parity of reasoning, be accounted for in the same way as some of us have explained the occurrence of the high-level gravels of Tertiary age, both on the north and the south borders of the Tamisian area.

Rev. J. Magens Mello, M.A., F.G.S.—I have read Mr. Whitley's paper with much interest. It is one which must give rise to many questions on doubtful points. Although dealing with the Belgian area, we must necessarily connect with this both the French and our own amongst others. I only venture now to allude to one or two points.

First, as to "the attempt to prove the great age of the human race by assuming the slow formation of the Quaternary deposits," I scarcely think this is what is usually relied upon, and whatever may be said in support of the theory of the extensive flood, pouring its waters over Northern Europe, and drowning the great mammalia and Man, and depositing over this area the great beds of gravel and clay, etc., which now overspread so much of the country, who can venture to say how long before this catastrophe Man made his appearance in these regions? neither have we any clue as to when such a flood occurred. It is quite possible that the late Sir Joseph Prestwich and others were right in attributing the close of the Pleistocene Age in Europe to a great depression and a consequent flood, after which we find a great change in the fauna; the disappearance by extinction or migration of old forms, and the incoming of new species, and also of a new race of men; but have we not clear proof also that between the Pleistocene Age and our own, changes were brought about in the physiography of these regions, so great, that they must have required the agency, not of passing flood, but of powerful denuding forces acting during a lengthy period?

We have to take into account not only the depression of the land some hundreds of feet, by which the British islands were severed from the Continent; but we have also to take into con-

sideration the cutting of deep valleys, and the scooping out of others, which, though previously existing, had been filled up with drift material. We have evidence in the implement-bearing drifts, that the rivers flowed during the human period at levels far above those of the present water-courses. We may note also such a great change as that shown by the disappearance of the old Solent river, and the severance of the Isle of Wight from the mainland.

Then again as to "the vast expanse of water" with which it is assumed Western Europe was surrounded, we must note that in the South the Mediterranean area was far less than it is now. During the Pleistocene Age the general level of the land was higher than it is now; and instead of occupying its present extensive basin, the Mediterranean Sea was then in all probability divided into two separate lakes; for not only did a land barrier connect Northern Africa with the Iberian peninsula; but to the East such islands as Malta and Sicily formed part of the mainland, and appear to have been another connecting link between Europe and the African continent. There is also evidence that the Nile country, at any rate, of Egypt has not been submerged since it was occupied by Palæolithic Man, as is proved by the recent remarkable discoveries made by Mr. Rt. de Rustafjaell of undisturbed Palæolithic flint factories in the Western Desert, near Gebelên, Thebes, El-Mallah and Nagâda.

As to the supposed climate of the Pleistocene Age, I am much disposed to doubt that its general character was one of "mild summers, and warm winters." Not to speak of the mammoth and woolly rhinoceros, which some may think do not necessarily bespeak arctic conditions, are not such conditions demanded by the presence of such undoubted arctic species as the musk-ox, the arctic fox, the glutton, the reindeer and others? Surely it is far more probable that during at any rate a great part of the age the climate was one characterised by severe winters, and hot summers; the former driving the northern fauna, even the musk-ox itself, as far south as the Pyrenees, whilst the hot summers would have enabled the African species to find their way along the river courses of Northern Europe, so that we find such a southern type as the hippopotamus as far to the north as Derbyshire and Yorkshire. It is owing to such a constant movement to and fro with the changing seasons, that the commingling of the respective groups of

animals, which is found in our cave and other Pleistocene deposits, is most easily accounted for; and this commingling we must note is that of animals which once lived together on the spot, not one brought about by a flood sweeping together the bones of animals which had no mutual connection.

At the same time we may allow that the great depression of the northern area at the close of the Pleistocene Age which brought about, amongst other results, the separation of our islands from the continent, may have been accompanied by a more or less sudden submergence of part of the area, and the evidences of this which were so ably set before us by Sir Joseph Prestwich cannot be lightly passed over.

Professor ORCHARD, M.A., B.Sc.—I have much pleasure in supporting—we all support—the vote of thanks which has been moved and seconded to the learned author of this valuable paper. It is a paper which supplies several illustrations of the great principle that there are no collisions between truth, that the facts of science—though not necessarily the speculations of scientists—are always in harmony with the statements of God's Word, the Bible. I have been struck, in reading the paper, with the carefulness of the investigation and with the general ability of the reasoning.

Some years ago we were told, by people who ought to have known better,* that our primitive ancestors were ignorant savages, themselves the offspring of certain ape-like forms whose habitual and congenial occupation was to crack nuts and run up a tree. He would be a bold man who, in view of the discoveries brought before us, ventured to maintain that theory now. We shall agree with the author that we cannot "for a moment believe that the men who possessed such splendid skulls and such large brains; who dressed in cloth and carefully-prepared skins; who adorned themselves with paint, necklaces and ornaments, and who reverently buried their dead in the belief of a life beyond the grave, were brutal and degraded savages. The idea is impossible." The supposed savage or barbarian turns out to be an ancestor of high respectability. He is not a warrior only, but also a huntsman, and a sailor. He is an artisan, a fisherman, and a trader. He concerns himself with

* It would seem as though, in this case, the sense of self-importance had curiously inverted the sense of filial respect.

pottery, tailoring, jewellery; and knows something of that great future which lies on the other side of death.

We shall, I think, be of opinion that, in view of the mistakes made by a scientist so eminent, and justly eminent, as Sir Charles Lyell, it becomes scientists to be modest. Science is necessarily progressive. Scientific facts are permanent; but scientific theories have no finality, they are provisional only; they are always open to revision and modification. In this they differ from the statements of Holy Writ, which are unchangeably and eternally true.

M. L. Rouse, Esq., B.L.—The fascinating paper that we have just listened to shows in the first place that the relics of Palæolithic Man in Belgium are found in a pebbly bed under a wide-spreading clay; and the fact that this clay throughout Belgium and North-Eastern France covers hill and dale like a skin.* Akin to these discoveries in the relative position of the relics is the one made five years ago at Ipswich, and worked at by Miss Nina Layard and her friends, as told by her at the British Association's meeting in Cambridge in 1904. The Palæolithic tools were covered with the clay of the Suffolk plateau to an average depth of ten feet; and, as Sir John Evans certified, they all lay upon the bed of an ancient lake. Thirty inches below them in coarse gravel were found bones of rhinoceros and other animals; and twelve feet lower still was the glacial boulder clay; and, in the discussion that followed Miss Layard's account, Professor Boyd Dawkins stated that every deposit of Palæolithic remains which he had seen in Britain lay above the glacial formations.

Mr. Gath Whitley has to-day presented us with facts that will be interesting to many. Some of us already knew that the Palæolithic (or antediluvian) folk were artists who could scratch upon bones good pictures of animals, indeed the late Sir William Dawson, in his "meeting-place of geology and history," had told us of a necklace made by them, composed of large teeth upon each of which was the figure of a different animal. And then—what do their statuettes themselves reveal, but that they were a well-clad people.

---

* I entertain much doubt regarding this wide-spread pebbly clay in Belgium. Having visited more than once the Liége district I do not recollect having noticed this wonderful deposit.—Ed.

In his Romanes Lecture delivered at Oxford last June, Professor Ray Lankester in "referring to the Emergence of Man, through material selection, stated that the Palæolithic implements, though not improbably made 150,000 years ago, do not, any more than do the imperfect skulls occasionally found in association with them, indicate a condition more monkey-like than is presented by existing savage races," *Daily Mail*, 17th June, 1907. The admission is most striking; but the chronology is absurd.

In the year 1863, Professor Faa de Bruns of Turin made a calculation that if the population of the globe had only increased at the rate that the population of France was then increasing—namely by $\frac{1}{227}$ per annum, from the time when a single family started from the ark (which he puts at 2344 B.C.), it would then have amounted to 1,300 millions, the figure at which it was set in his time. (Quoted and confirmed by S. Moigno in his review, *Les Mondes*, for 1863 pp. 516, 517.)

Professor J. L. Lobley.—The *Pithecanthropus erectus*, which has been mentioned in the discussion, was discovered in 1894, in Borneo, by M. Dubois, and is famous as being the oldest of the Primates yet known with the vertical axis of Man, and so has been called the "missing link." Implementiferous gravels are by no means confined to the bottoms of river valleys, since they often form terraces along the sides of such valleys, sometimes at considerable elevations above the present rivers which are thus shown to have cut down these valleys deeper since Man had first occupied them.

Dr. W. Woods Smyth.—I have much pleasure in seconding the vote of thanks to the author of this interesting paper, and to compliment him on the great amount of information which he has compressed into a small compass.

I beg, however, to differ from the writer in regard to his estimates regarding the man of Spy and the Neanderthal man. Professor Huxley's words ought to be quoted, and are as follows:—"They were powerfully built, with strong, curiously curved thigh bones, the lower ends of which are so fashioned that they must have walked with a bend at the knee. The difference is abysmal between these rude and brutal savages and the comely, fair, tall and long-headed [*i.e.*, high foreheaded] races of historic times." The latter point in regard to the thigh bones is of the greatest significance. We may mention a fact here which has an important bearing upon these

Primeval men. Sir Wm. Dawson has pointed out that the mammals of the Tertiary exhibit a shortening of the brain as well as increase of size in the later Tertiary and Quaternary Ages. Now, this is exactly what has taken place in the brain-box of men. Here is a photograph of the skulls of the man of Spy and the Neanderthal skull, with the skull of the *Pithecanthropus erectus* below, and a skull of the modern European above. The shortening of the dolichocephalic shape in the modern skull is manifest, a feature shared by the man of Truchère. This is convincing evidence of the man of Truchère being of a later date. These races could only have been synchronous in the sense of their overlapping each other at either end of their racial histories, as is seen in all decaying and rising races of organisms. Observe, in round numbers, the capacity of the skull of the modern man is 1,500 c.c., the skulls of Spy and Neanderthal 1,200 c.c., while the *Pithecanthropus erectus* is 1,000 c.c., and the highest ape reaches 500 c.c., the monkey 250 c.c. Surely we have here evidence of progressive evolution.

The points relating to the interest which the Victoria Institute has in view are important, and have formed the subject of a communication of mine to this Institute. The men, male and female, of Genesis 1, were evidently a pre-Adamic race, from which no doubt Adam was derived. By no torturing of Scripture can you make the "female" of the first chapter the Eve of the second. Because the female of the first chapter is on the open field of Nature, where Eve was not until after the fall, which event cannot be placed in the sixth day, which concluded with all things being very good. Again, the immense skull capacity of these early men, compared with that of the modern man, is an evidence of some deteriorating element having entered the human race at an early date, and points distinctly to the fall.

I am glad that Mr. Gath Whitley adduces evidence of the Noachian Flood, in which he has the support of the late Sir Joseph Prestwich.

Colonel HENDLEY, who had taken the second chair, then put the vote of thanks, which was carried unanimously, and the meeting separated.

ORDINARY GENERAL MEETING.*

MR. MARTIN L. ROUSE, B.L., IN THE CHAIR.

The Minutes of the previous meeting were read and confirmed.

ASSOCIATE.—Miss Ellen Rouse, 10, Leinster Gardens, London, was elected Associate.

The following paper was read :—

THE INFLUENCE OF THE GLACIAL EPOCH UPON THE EARLY HISTORY OF MANKIND. By Rev. Professor G. FREDERICK WRIGHT, LL.D., F.G.S.Am.

WHEN in 1859 Dr. Falconer, Professor Prestwich, Sir John Evans, and Sir Charles Lyell with some other English geologists returned from a visit to Amiens and Abbeville, in the valley of the Somme in northern France, and reported their acquiescence in the genuineness of the discoveries by Boucher-de-Perthes of rough stone implements in connection with the bones of *Elephas primigenius* and other extinct animals in the "high-level" gravels of the Somme, a great sensation was produced in the scientific world. For, as was fully shown by Sir Charles Lyell in his work upon the *Antiquity of Man*, published in 1863, these discoveries, and other similar ones made in different parts of France and in southern England, involved the existence of man during the continuance of the Glacial Epoch. Innumerable subsequent discoveries both in Europe and America have confirmed this conclusion; and the existence of "glacial man" has been very generally accepted.

One of the chief reasons for the general public's hesitation to accept the evidence for glacial man arose from the then prevalent opinion that the Glacial epoch closed about 100,000

* 6th January, 1908.

years ago, and, therefore, that the acceptance of this view involved an enormous antiquity for the human race. At that time Lyell's uniformitarian theory concerning geological movements was scarcely questioned by any, and it was deemed legitimate for geologists to make unlimited demands upon the Bank of Time. An interesting illustration of this is found in the calculation made by Charles Darwin in the first edition of his *Origin of Species*,* where he estimated that a limited amount of erosion of the geological deposits in southern England must have occupied over 306 million years, which he says is a "mere trifle" of geologic time. Indeed, the uniformitarians generally regarded such a period as 500,000,000 years as a convenient thing to conjure with, while Sir Andrew Ramsay and others† maintained that for all we could tell geologic time was absolutely limitless.

But since the publication of the first edition of *The Origin of Species* and of Lyell's *Antiquity of Man* there has been a startling revolution in the opinion of scientific men concerning the age of the world and the length of geologic periods. In the later editions of *The Origin of Species* the calculation above referred to has been omitted and a paragraph inserted in its place, making some very pertinent remarks about the inadequate conception which most men have of the significance of even one million years and of the changes which would take place during that period, even at a very slow rate. Sir Archibald Geikie emphasises the point by calling attention to the fact that if a river lowers its bed by erosion one foot in one thousand years (which certainly is a very slow rate) it would produce a gorge 1,000 feet in depth in one million years. Such rivers as the Colorado in America are entirely competent to have eroded a cañon 6,000 feet in depth in one million years. Indeed on every hand evidence is multiplying of the great activity of the forces which produce changes in the earth's surface and in the species of animals and plants which live upon it.

It was Professor George H. Darwin who first demonstrated to the satisfaction of his fellow mathematicians that the moon was thrown off from the world not more than one hundred million years ago, and therefore, that the geological ages whose history is studied in the stratified rocks of the earth must be compressed within that period. Later, Lord Kelvin has voiced the pretty general belief of his associates in maintaining that

---

* See pp. 250–252.

† See Lord Kelvin's Annual Address at the Victoria Institute, 1897.

wenty-four million years is all the time which geologists can have at their disposal.* With him Alfred Russell Wallace is in substantial agreement, maintaining from the rate of probable deposition of geological strata that thirty million years is really all the time that geologists require.

The approximate correctness of these recent calculations cannot well be doubted, since they rest upon very substantial data from which speculative considerations are largely eliminated. Professor Darwin's calculations are based upon the known influence of the tides in retarding the revolution of the moon upon its axis, while Lord Kelvin's confident assertion rests upon the known laws governing the radiation of heat from the solar system, and Wallace's conclusions are largely derived from the new light which recent studies have shed upon the rate of erosion which is going on upon the surface of the earth at the present time. Extended and careful investigations show that the Mississippi is depositing sediment in the Gulf of Mexico at a rate which would require the removal of one foot of soil from the entire area of the Mississippi basin, stretching from the Rocky to the Alleghany mountains, in less than 5,000 years. This would lower the level of the whole American continent 200 feet in 1,000,000 years. If this process continues without interruption not much will be left of North America after 3,000,000 or 4,000,000 years. Other river systems are much more active on account of the steeper gradient of their channels. The Po, for example, is lowering its basin at the rate of one foot in 700 years.

It is true that geologists have not readily accepted these narrow limits imposed upon them by the astronomers and physicists, and they are attempting by various lines of argument to obtain an extension of credit to the extent of 100,000,000 years or so. But even with such an extension the case is very different from what it was when 306,000,000 years could be spoken of as a "mere trifle." In the readjustment of the ratios of geologic periods under these new limits the Glacial Epoch is brought down to comparatively recent time.

Dana's estimate of these ratios are twelve for the Palæozoic Period, three for the Mesozoic, and one for the Cainozoic, which includes the whole of Tertiary and post-Tertiary time. If we accept Lord Kelvin's estimate of the whole time at the disposal of geologists, these ratios would give us 18,000,000 for Palæozoic time, 4,500,000 for Mesozoic, and 1,500,000 for Cainozoic time,

* See Annual Address as above.

while post-Tertiary time, which includes both the Glacial and post-Glacial Epochs, is probably not more than one-thirtieth of the Cainozoic Period, which would be 50,000 years. But even if this is doubled, and 100,000 years is allowed for it, the post-Glacial Period, which is certainly not more than one-tenth as long as the Glacial, would be only 10,000 years.

We are, however, not dependent on speculative calculations alone to bring the close of the Glacial Epoch down to so recent a period that it is injected far into that of human history. Within the past twenty-five years, innumerable data have accumulated in America to prove that the ice of the Glacial Epoch lingered over the northern part of the United States as far south as the 43 degree of N. latitude as late as 7,000 years ago. This evidence is so clear and of such a varied character that it cannot be resisted when once it is clearly understood.

The evidence naturally falls under five divisions :—

1st. The small recession of post-glacial waterfalls.
2nd. The small enlargement of post-glacial river valleys.
3rd. The limited extent to which post-glacial lakes, ponds, and kettle holes have been filled with sediment.
4th. The small amount of the sub-aerial erosion of the surface of limestone rocks in post-glacial time; and
5th. The identity of the flora of glacial with that of the present time.

1st. In America, at least, nearly all the waterfalls are in the glaciated region, and have been produced by the damming up of pre-glacial water-courses with glacial *débris*, so that the drainage is diverted into new channels where we can estimate the amount of erosion which has taken place since the withdrawal of the ice. The Falls of Niagara and those of St. Anthony in the Mississippi River at Minneapolis are among the most spectacular of the instances at our command, but they are by no means the only ones. The waterfalls in the United States which have been produced by obstruction of the pre-glacial drainage by the irregular deposit of glacial *débris*, are numbered by the thousand, and everywhere illustrate the limited amount of work accomplished by streams since the Glacial Epoch. But in none can calculations be so easily made as in the cases of Niagara and the Falls of St. Anthony.

In pre-glacial times the drainage of the Lake Erie basin followed a channel leading to the head of Lake Ontario forty or fifty miles west of the Niagara. This had been occupied for such an enormous period that the Lake Erie basin was drained

to its bottom, and whatever cataract had formerly existed had entirely disappeared, and there was an uninterrupted channel from one basin to the other. During the Glacial Epoch this channel was filled with glacial *débris*, or boulder clay, so that it was completely obstructed and the water diverted to its present channel. But the drainage of this basin could not resume its eastward flow to the Atlantic Ocean until the glacial ice obstructing it had retreated from the Mohawk Valley in the central part of the State of New York.

The difference between the levels of Lake Erie and Lake Ontario is, in round numbers, 325 feet (Lake Erie being 575 feet above tide and Lake Ontario 250 feet), but the coll at Rome, New York, leading into the Mohawk Valley, is, in round numbers, only 100 feet above Lake Ontario. Until, therefore, the ice had retreated from this coll at Rome, New York, there could have been no eastward drainage from the Great Lakes, but as soon as it was removed the renewed eastward drainage could begin, and the Niagara river would commence the erosion of its gorge where it plunged over the escarpment at Queenstown. The time required for the erosion of this gorge between Queenstown and the present cataract represents the time which has elapsed since the ice of the Glacial Period retreated from the central part of New York between the Adirondack and the Catskill mountains; while over the lower St. Lawrence Valley, and indeed over nearly all of Quebec and Ontario, it must have lingered to a much later date. The problem, therefore, is to find the age of the Niagara gorge. Until recently this was largely a matter of conjecture, but now our calculations may rest upon a solid basis of observed facts.

The length of the Niagara gorge is, in round numbers, 7 miles or 35,000 feet. The strata of rock through which it is cut are of very uniform composition. At the surface we have a stratum of compact Niagara limestone, 25 or 30 feet thick at the mouth of the gorge, but between 70 and 80 feet at the present cataract. Underneath the Niagara limestone very uniform strata of Niagara shale, about 80 feet thick, extend through the whole distance. It is this relation of the soft beds of Niagara shale to the overlying stratum of compact limestone which occasions the cataract. The back lash of the plunging water erodes the underlying shale and leaves projecting masses of limestone over which the water falls in perpendicular descent. From time to time these masses of projecting rock fall to the bottom, so that the edge of the cataract is made to retreat.

But the volume of water is so tremendous and its fall so great that the largest masses of rock are moved by it, and, being rubbed together by the motion, are gradually reduced to powder, and carried away piecemeal, leaving the base of the fall unencumbered.

Underneath the Niagara shale there are four other persistent strata of alternate hard and soft character. The Clinton limestone is about 30 feet thick and very compact, but it rests upon about 70 feet of shaley rock which is easily disintegrated. This Clinton shale in turn rests upon a stratum of compact Medina sandstone 20 to 30 feet thick; and that upon a shaley rock reaching to the water's edge. All these strata dip slightly to the south toward the cataract. Owing to this dip and to the gradient of the stream, all but the two upper strata disappear below the level of the stream a little more than half way to the cataract, so that practically our problem involves the simple question of the erosion of the 35,000 feet of the two Niagara strata.

In 1841, Sir Charles Lyell visited Niagara, and from a hasty examination published a random guess that the rate of recession did not exceed 1 foot a year, and probably was not greater than 1 foot in three years; according to which the beginning of the erosion of the gorge must have been as far back as 35,000 years at least, and probably 100,000 years. Unfortunately, these figures have passed into the literature of the subject, and, owing to Lyell's great authority, have been accepted as scientific facts. But Sir Charles was himself very far from regarding them so; for, at the time, he urged Professor James Hall, of the New York State Geological Survey, who accompanied him, to make an accurate trigonometrical survey of the crest of the Falls, so that there should be a proper basis of comparison with future surveys, which would reveal the actual facts.

Such a survey was made in 1842. Permanent monuments were erected at the points at which the angles were taken, and all the details properly recorded in the third volume of the report of the Natural History Survey of the State of New York. After the lapse of sixty-three years, the last of four recent official surveys of the falls was made in 1905 by Mr. W. Carvel Hall. Taking these surveys as the basis of his calculations, Dr. G. K. Gilbert, one of the most experienced members of the United States Geological Survey,* has reached the conclusion that the actual annual rate of recession of the Horse Shoe Fall for the

* See *Bulletin of the U.S. Geological Survey*, No. 306, 1907.

whole period between 1842 and 1905 is 5·3 feet. The Horse Shoe Fall has receded since Sir Charles' visit 338 feet. There can be no question, therefore, that at the beginning of the Christian era the edge of the cataract was $1\frac{3}{4}$ miles lower down than now, and that at the time of the Trojan War it was at the head of the whirlpool rapids, nearly three miles below, and that at that more distant period of human history, marked by recent discoveries in Egypt and Babylonia, this marvellous cataract was just beginning its work of erosion while Canada was still as well within the grasp of the Glacial Epoch as Greenland is to-day.

Professor N. H. Winchell's investigations into the age of the Falls of St. Anthony at Minneapolis lead to almost identical results, results which are confirmed by the general appearance of almost all the waterfalls of the glaciated region of North America.

2nd. There are innumerable river valleys, large and small, within the glaciated region whose limited depth and width bear indubitable testimony to the shortness of time during which the streams have been active in erosion. Through some public works in Oberlin, Ohio, I have had unusual opportunities the last few years to make definite observations upon the extent of the erosion of a small post-glacial stream and upon the rate of its activity.

As soon as the glacial ice had retreated north of the watershed separating the Mississippi valley from the Great Lakes, and up to the time when the ice had melted off from the Mohawk Valley, permitting the Falls of Niagara to begin their work, a temporary body of water occupied the Lake Erie basin with its outlet into the Mississippi Valley. The shore lines of this temporary lake are easily followed for hundreds of miles.

Plum Creek, from which this new evidence comes, is in the village of Oberlin, Lorain County, Ohio, 12 miles back from the present lake and 5 miles back from the old shore line. This old shore line is 200 feet above the present lake, and Plum Creek is 250 feet above the lake, or 50 feet above the level of the shore line of the glacial lake. The creek, therefore, has been at work eroding its present trough ever since the ice retreated from the southern watershed far enough to permit the water of the glacial lake to settle down to the level of the 200 foot shore line. It is well known that this level was determined by the elevation of the coll at Fort Wayne, Indiana, leading into the Mississippi Valley through the head waters of the Wabash River. Plum Creek, therefore, is as much older

than Niagara as the time required for the retreat of the ice from the Mississippi watershed to its removal from the valley of the Mohawk in Central New York, amounting perhaps to 1,000 or 2,000 years.

Upon measuring a section of the eroded valley 5,000 feet long, I was able to determine the total amount of work done by the stream since the beginning of its flow. Twelve years ago the village, in constructing waterworks, turned the course of the stream into a new channel, cut for it 500 feet long, so that we are now able to estimate the rate at which this stream under favourable circumstances is carrying away material from the valley. As the full calculations and results are soon to be published elsewhere, I shall not go into details here, but will simply say that they are entirely inconsistent with a supposition of more than 10,000 or 12,000 years as the period of the stream's activity. The calculations fully corroborate those which have been made concerning the age of Niagara Falls. The supposition that this creek has been at work for 100,000 or even 35,000 years is erroneous in view of its present known activity.

3rd. The small extent to which the innumerable lakes, ponds, and kettle-holes which dot the glaciated region have been filled up leads to the same conclusion. Such are the forces at work to drain and fill up these depressions, that a few thousand years is all that is required to bring them into their present condition. Many of them have been already obliterated, while the others show that the obliterating forces cannot have been in operation many thousand years.*

4th. Another confirmatory witness to the short time which has elapsed since the Glacial Epoch is found in the small extent to which the surface of limestone strata, which were once highly polished through the action of glacial ice, have since that time been disintegrated and eroded by sub-aerial agencies. The activity of these agencies can be seen on the tombstones in any ancient cemetery and in the exposed walls of old buildings. Now, in the glaciated region, where polished limestone surfaces have been exposed, there are frequently in close proximity areas that have been protected by superincumbent large boulders which are standing on a low pedestal left in the process of surrounding sub-aerial erosion. But these pedestals are never more than two or three inches in height, showing that a few thousand years would be amply sufficient to produce the results.

---

* See Author's *Ice Age in North America.*

5th. Though there was a great destruction of animal species in connection with the closing stages of the Glacial Epoch, there has been little change since then in the species of plants that remain; while the identity of the species of plant life and the freshness of their remains found in glacial deposits make an irresistible impression of the proximity of the great ice age to the present time. In various parts of the United States there are the remains of red cedar forests buried beneath glacial drift in which the perfume of the cedar lingers as fresh as if cut but yesterday.

Comparing now the chronology of the human race in the Euphrates Valley and that of glacial man in North-Western Europe and in America, it would appear that they were for a time contemporaneous; and that the human race presented about as great extremes in culture then as it does now. With the exception of various labour-saving inventions which have been made within the last three or four centuries, the civilization in ancient Babylonia was as far above that of contemporary Paleolithic man, living on the border of the ice-fields in England and America, as that of Europe is above that of the Esquimaux who live upon the borders of the Greenland ice-fields. Substantially the same differences in culture existed then as exist now.

Considered in its total result, the progress of mankind has not been by any means so great as it is popularly represented to have been. Ten thousand years ago the human race possessed all the leading characteristics which it possesses at the present time. There were centres of high civilization in favoured localities, and there were wide areas of barbarism and savagery where man barely maintained his existence through a desperate struggle with the conditions of life. The same is true to-day, only the centres have shifted and some races have come into possession of knowledge enabling them to control the forces of nature for certain purposes much more completely than ever before; but a large portion of the human race is still carrying on the struggle while in possession of only the most primitive means of culture. The Stone Age has not wholly disappeared from the world.

The probable influence of the Glacial Epoch upon the early history of mankind will be best perceived by taking a general view of the progress of geological events in post-Tertiary time. In doing so it is important to note that the Tertiary Period which culminated in the Glacial Epoch closed with a high

elevation of land over all the Northern hemisphere. This is evident from so many facts that we do not need to pause here for their full presentation. Briefly stated, the facts are that all the northern part of America stood at an elevation of between 2,000 and 3,000 feet above that which it has at present. The same is also true of Northern Europe. During the Tertiary Period, also, as is well known, all the high mountain chains of the world received their present elevation; marine strata of the Middle Tertiary Period being frequently found at an elevation of from 10,000 to 15,000 feet above the sea. In the latter part of the Tertiary Period, also, the animal species which now occupy the earth attained their present characteristics, while a large number of closely allied species which attained great prominence flourished for a while, but in connection with the vicissitudes of the Glacial Epoch either became extinct, or shifted the centre of their field of occupation. From the evidence of man's co-existence with them during the closing stages of the Glacial Epoch, it would appear that he, too, came upon the scene soon after the close of the Tertiary Period, and was distributed over the surface of the earth while the elevation of the Tertiary Period still furnished land communication between the Eastern and Western hemispheres.

Presumably this land communication was between Asia and North America in the region of Behring's Straits and Behring's Sea. Here an elevation of a few hundred feet would lay bare a vast tract of land furnishing pasturage for animals and all the means of sustenance that primitive tribes would demand. The same amount of elevation would also lay bare a border of the American continent all the way to California, which is now only slightly submerged; and open the way for the dispersal through America both of man and of the now extinct animals with which he was associated.

Clear evidence that this was the course of events is shown by man's association with the mammoth. The remains of this huge species of elephant are found in great abundance in connection with those of man, not only over North-Western Europe, whither they had migrated in one direction from their original centre, but all over Northern Siberia and the islands adjoining, and onward to Alaska and over the northern part of the United States, penetrating on the western coast as far south as Mexico.

With these things in mind, we may now see how important a factor the Glacial Epoch probably was in affecting the destinies of man. This elevation of land at the beginning of

the Glacial Epoch probably continued far down towards its close, when it was followed by a depression to a level considerably below that of the present time. This is clearly evinced by post-glacial marine deposits and beaches which are now found several hundred feet above the sea in Canada and Scandinavia. The extreme depression, as shown by these raised beaches, was in both places fully 1,000 feet. It is evident also that, at the time of the extreme extension of glacial ice in America, the gradient of all the south-flowing streams was greatly reduced, indicating a differential northerly depression over the whole interior of the United States.

It is easy to see, therefore, that during the culminating period of the Glacial Epoch, man and his contemporary animals in America were shut off from communication with Asia, and the area from which they derived subsistence was greatly limited, both by the submergence of the continental shelf and by the great extension of the ice fields, reaching in the Mississippi Valley in Southern Illinois the latitude of 38°. At the same time, there was a great incursion of the ice upon the fertile portions of Europe. Switzerland was obliterated, Great Britain nearly so, all Northern Germany was covered, and Russia to within a short distance of the Black Sea.

On the other hand, Central Asia seemed to receive a great increase of fertility. From recent investigations it appears that Siberia and Central Asia were not invaded by glacial ice.* But there was a great extension of the glaciers still existing in the high mountains. Those of the Thianshan range merit special mention. This vast mountain system rises in peaks to a height of 23,500 feet, or 8,000 feet higher than the Alps; while its mass is estimated to be twenty times that of the Alps. Small glaciers still exist far up in the higher altitudes. During the Glacial Epoch they descended to the 7,000 foot level, but never reached the great plains at a lower level. A subsidiary result of this extension of the mountain glaciers in Central Asia was a marked increase in the size of the mountain streams upon which the population of the plains depended for irrigation.

The importance of irrigation to the population of Central Asia is not generally appreciated. Our attention has so long been fixed upon Egypt and its dependence upon the Nile that we have not given sufficient consideration to other regions dependent upon irrigation. Now, around the base of the Thianshan mountains, there is an area many times the size of

* See Wright's *Asiatic Russia*, 2 vols., McClure & Co., New York.

Egypt, whose life depends upon innumerable streams—large and small—which bring down their life-giving supplies of water in due season from the heights where it has been detained in unfailing cold-storage reservoirs far more regular and reliable than the lakes of Central Africa, which are subject to the vicissitudes of the annual precipitation and to the temporary obstruction of their outlets by the accumulation of vegetable matter.

The natural influence of the vicissitudes of the Glacial Epoch upon the development of life in Central Asia can be readily perceived. The conditions leading to the increase of glaciers in the mountains, especially those connected with the rapid melting of the ice during the declining portion of the epoch, would greatly extend the area of fertility and promote the interests of all forms of life. It is interesting to learn that this very region, which is the traditional centre for the dispersion of the human race, and in which, beyond all reasonable doubt, the Aryan races had their original home, has recently been found to be an important centre of pre-historic man. Professor Raphael Pumpelly announces, as one of the results of the Carnegie Expedition to explore the pre-historic mounds of Turkestan, the discovery of remains of man which he estimates to date from 8250 B.C., and of other evidence, showing that at about this time man had already succeeded in accomplishing the wonderful feat of domesticating the ox and several other animals.*

The decline of the Glacial Epoch in Central Asia is connected, either as cause or effect, with the subsequent diminution of the size of the mountain streams and the general desiccation of that region, thus reducing its fertility. The result of this has been to intensify the struggle for existence, to compel increased migration, and thereby to give a new impulse to new centres of civilization. It is worthy of mention, also, that the same diminution of glacial conditions in Central Asia which limited its capacity to support population opened up the fairest portions of Europe and North America and invited their occupation by man. In America we are but just entering upon our inheritance, America's great prosperity being largely due to the rapidity with which we are now seizing the reserved stores of richness accumulated in our soil by the glacial deposits and by the chemical changes which have taken place during the thousands of years through which it has since been lying fallow.

* See his *Report to the Carnegie Institution, Washington*, 1906.

The disturbing influence of the Glacial Epoch is specially to be noted in the destruction of animal species, which in some way took place in connection with it, including, apparently, that of a large portion of mankind. At the close of the Tertiary Period "the great Irish elk, the *machairodus* and cave lion, the rhinoceros, hippopotamus, and elephant" roamed over Europe, and "equally large felines, horses and tapirs, larger than any now living, a llama as large as a camel, great mastodons and elephants and abundance of great megatheroid animals of almost equal size" were abundant in North America, "while in South America these same megatheroids in great variety, numerous huge armadillos, a mastodon, large horses and tapirs, large porcupines, two forms of antelopes, numerous bears and felines, including a *machairodus* and a large monkey," flourished. But all of these have become "extinct since the deposition of the most recent of the fossil-bearing strata,"* and their destruction can be very clearly traced to the vicissitudes of the Glacial Epoch.

In the glaciated regions the bones of all these northern species are found in abundance in the gravel and loess deposits connected with the closing scenes of the epoch, or in the bogs where the animals had been mired in the early part of the post-Glacial Period. That man shared in this destruction throughout North America and Europe is rendered altogether probable by the way in which his remains are associated with those of these extinct animals. These have been found in connection with the bones of one or more of the above-mentioned animals deeply buried in undisturbed beds of loess in definite relations to certain stages of the glacial recession at Omaha, Nebraska, Lansing, Kansas, and Kiev, Russia. They have been found in similar connection with the bones of these extinct animals in various gravel deposits of glacial origin in the United States (notably at Trenton, New Jersey) and in similar deposits, doubtless of the same age, in Northern France and Southern England, while a similar connection between these extinct animals and man is shown by still more abundant evidence in the results yielded by the excavations of numerous pre-historic cave dwellings in North-Western Europe.

At this point it will be profitable to turn our attention to the process by which this great destruction of man and his post-Tertiary animals was secured. Evidently the destruction was brought about largely as a result of the disturbance of conditions

* Alfred Russell Wallace, *Geological Distribution of Animals.*

affecting the struggle for life between competing species. In the advance of the glacial ice in North America, for instance, animals and plants were driven southwards from an area of 4,000,000 square miles; the southern border of which reached in Illinois nearly to the junction of the Ohio with the Mississippi River in latitude 38°.

It is impossible to over-estimate the strenuousness of the struggle for existence which was set up in the restricted area in the southern part of the United States and Northern Mexico, lying between the glacial conditions in the north and the tropical conditions which prevented migrations southward across Central America. Then, again, upon the amelioration of the northern climate and the re-opening of the northern region to the animals which had survived the former changes of conditions, many of them re-occupied the ground, and began the struggle with new conditions, to which some of them, especially the mammoth, in due time succumbed.

Local floods of enormous extent during the closing stages of the Glacial Epoch seem to have been connected in a marked degree with the destruction of both man and animals which took place during this epoch. The remains of man which have been found within the last few years in the loess of the Missouri Valley (referred to above) are connected with annual floods which can be definitely proved to have risen 200 feet. These floods were occasioned by the rapid melting of the ice in the upper part of the valley, and the gorging of the water lower down, producing annually for a while in the latter part of each summer a temporary lake 1,000 miles long and from 70 to 80 miles wide. Similar conditions existed in the valley of the Ohio and down the Mississippi as far as Vicksburg.

At this time the depression which now contains Great Salt Lake in Utah was filled up to a depth of 1,000 feet, and covered an area of 20,000 square miles, ten times that of the present lake. When at last this glacial lake surmounted its barriers and broke over into the Snake River Valley, it quickly brushed away 350 feet of the mud barrier which restrained it, and that depth of water rushed down the valley in a torrent as large as Niagara for 25 years.* The results of this are incomprehensible.

Likewise in Southern Russia, if the loess covering that region is connected with the same stage of the glacial recession, man

* See Gilbert's *Report on Lake Bonneville, U.S. Geological Survey.* A summary is given in my *Man and the Glacial Period*, New York, 1900.

and his associates were there subject to a similar destruction by local floods. Distinct evidence of a great change of land level of that region at about that time appears in a raised beach of modern origin 750 feet above the Black Sea at Trebizond. In fact, I think there is conclusive evidence that all Northern Siberia, Western Turkestan, and the larger part of Russia were depressed below sea-level in connection with the great earth movements which took place during the latter part of the Glacial Epoch.

At a corresponding period, also, the Tarim depression south of the Thianshan mountains was covered with water to a great depth. I had suggested* that this may have been occasioned at the time of the depression apparent in Northern Siberia by the water pouring over into the desert of Gobi through the Sungarian depression; but Mr. Ellsworth Huntington, who has recently returned from an exploring expedition in that region, thinks that this accumulation of water in the Gobi basin was directly due to the glacial conditions which gave to the glaciers in the surrounding mountains the vast extension to which we have already referred.† If that be so, it would be in close analogy to the enlargement of Great Salt Lake, the existence of both bodies of water being synchronous.

In the case of the Dead Sea, which Professor Hull has shown to have been filled with water within a comparatively recent time, he has suggested that this enlargement, like that of Great Salt Lake and Lob Nor, was a direct result of the Glacial Epoch, and of the accumulation of glaciers upon the mountains at the north. But as my investigations appear to show that the Lebanon mountains never supported more than one glacier, and that a small one, on whose terminal moraine the famous grove of cedars is now standing, I am inclined to connect the temporary enlargement of the Dead Sea (during which the Jordan Valley was filled to a depth of 1,400 feet) to that post-glacial depression of land which we have traced so extensively elsewhere, and of which Professor Hull and others have adduced such clear evidence around the eastern border of the Mediterranean basin. This depression was certainly 250 feet, which would be sufficient to admit Mediterranean water into the Jordan Valley through the valley of Esdrealon, whose highest point is only 215 feet above sea-level.

---

* See *Scientific Confirmations of O.T. History*, Hodder and Stoughton, London, 1907.

† See the *Geographical Journal*, vol. xxx, No. 3, Sept. 1907.

That these great changes of land level were in some way connected with the Glacial Epoch is beyond question. And it is not difficult to perceive in the forces connected with this remarkable epoch a cause for this unstable condition of the earth's crust so late as that of the pre-historic period of man's existence. During the Glacial Epoch at least 6,000,000 cubic miles of ice were piled up over the northern part of America and of Europe. For the production of this ice enough water would have to be abstracted from the ocean to lower its level 250 feet the world over. Other high authorities would make the amount of ice twice, or even three times, that which we have indicated, with a correspondingly larger amount of water abstracted from the ocean.* But even on my own moderate estimation we have a shifting of weight from the ocean beds to the limited area of glaciation amounting to 24,000,000,000,000,000 tons, equalling the total weight of the North American continent. The transference of such an enormous weight from the ocean to the continents and its subsequent return to the ocean is a force so inconceivable that we cannot estimate its efficiency in disturbing the equilibrium of the continents, and causing depressions and elevations of land out of all analogy to those which we have witnessed within the historic period. But pre-historic man evidently did witness these disturbances and was profoundly affected by them.

Indeed, the story of the Noachian Deluge becomes easily credible to the attentive student of the shifting forces at work during the glacial epoch; and the rapidly changing conditions to which man was subjected during this trying period of his history may readily account, on the principle of Natural Selection, for the rapid differentiation of the race in its final distribution over the world.

While the results of our studies in the Glacial Epoch are not as definite in their results as one would wish, this important conclusion is established, namely, that in the early periods of the existence of the human race there was an instability of conditions arising from the instability of land levels caused by the Glacial Epoch which frustrates all attempts to reason backwards by analogy from present conditions.

---

* See Chamberlin and Salisbury's *Geology*, vol. iii, pp. 327–502.

Discussion.

Professor Hull desired to be allowed to move the thanks of the meeting to Dr. Frederick Wright for his remarkable and very able paper to which they had just listened. It was of special interest to have amongst us a recognised leading geologist from the other side of the Atlantic; and he (the speaker) had to confess that when the title of the paper was placed in his hands as Secretary, he felt very curious to find whether the author would be able to bring into closer proximity than is generally allowed these two great events —namely, the appearance of Man, and the disappearance of the Glacial Epoch. After listening to the evidence adduced, he felt free to admit that the author had succeeded in doing so to a large extent. He thought that Dr. Wright's paper would help to forward the view that the lapse of time since the close of the "great Ice Age" was shorter than some geologists had supposed—notwithstanding the great physical changes which had taken place in the earth-history of post-Tertiary times. The uniformitarian theory would have to be abandoned, notwithstanding the distinguished names by which it has been advocated. In opposition to this theory it was equally arguable, that the geological history was one of alternating paroxysms and repose; in the latter of which, we, as human beings, have, by the foresight of an over-ruling Providence, had our lot cast —after the paroxysmal epoch of Pliocene times—when stupendous earth-movements had their sway both over continents and oceans. He begged to move the best thanks to the author.

Professor Langhorne Orchard, M.A.—It gives me much pleasure to second the vote of thanks, so felicitously proposed by Professor Hull, to the author of one of the most valuable papers brought before this Society. The reasoning is clear, crisp, convincing, and it is no small advantage to students of the subject to listen to the careful conclusions of a geologist who is easily among the leaders in his profession.

One of the earliest allusions in the paper is to the important work done by Lor Kelvin in fixing the time-limit of terrestrial life.

That "Prince of Science" is no longer with us. The whole civilised world is conscious of a great absence. Not by our Society only, but wherever science and philosophy have a home, Lord Kelvin's name is known and honoured. A born investigator, he recognised the Creator through the Creation, and natural phenomena were to him avenues to the great First Cause. He consistently interpreted the secrets of Nature in the language of truth; whatever he touched he beautified, and he illuminated science with the calm lustre of a Christian life. As we offer to Lord Kelvin's memory the tribute of an affectionate admiration, we thank God for giving such a man. His work will remain with us as a permanent asset, his example as an inspiration.

In connection with Darwin's mistake, referred to by the author, one is reminded that this is not the only instance of the healthy common sense of the people rebuking the theories of a visionary scientist.

Two very important points are emphasised in the paper. The first is the young antiquity of Man, who is supposed to have made his appearance in Central Asia (where the temperature was not severe) at the close of the Glacial—or may I say at the beginning of the post-Glacial?—Period. According to Dana's estimate of ratios, Man's appearance took place about 5,000 years ago; but the learned author seems to prefer 7,000. I would suggest that we take the mean of these two estimates, 6,000 years or thereabout, as the probable length of Man's terrestrial tenancy up to the present time. This is in close agreement with that obtained by applying Dana's ratios to Wallace's estimate. It also accords with the belief of Professor McK. Hughes, that there is no real evidence of Man's existence at a period more remote than "the post-Glacial river gravels." The second important point is that "the story of the Noachian Deluge becomes easily credible to the attentive student . . . ." With regard to this matter, scientists have progressed surely, if slowly: and, to quote the words of Sir J. W. Dawson, we may be satisfied that "geological investigation has now finally taken its place along with sacred history in the vindication and illustration of the much-controverted and much-ridiculed flood of Noah."

I beg to second the vote of thanks.

Mr. MARTIN L. ROUSE, B.L.—We owe deep and cordial thanks to Professor Wright; for he has given us this paper, not as one who has any reputation to earn through our means, but as one who

has long since made a name in the field of geologic science. He has here proved by solid research and experiment, made both by others and by himself, that the whole period of human existence upon the Earth is far shorter than recent geologists have maintained, and approaches much nearer to the extent that we infer for it from a study of the Bible.

I would ask, however, whether the result that apparently flows from Dr. Gilbert's measured annual recession of Niagara Falls—namely, a period of 7,000 years for its total recession—may not at once be greatly reduced by taking into account the relative thickness of compact rock in the uppermost hundred yards where the recession has been measured, and which is close upon 80 feet, and the average thickness for the whole course of seven miles [which I find to be only about 66. The recession probably started from the complete break-up of the Glacial Epoch, so I await a still further reduction in the reckoning]. Meanwhile, it can be proved in another way that the human period is vastly shorter than is supposed by many scientists who ignore the figures that have come down to us in the Bible.

Taking an estimate given by Lord Avebury in 1904* (which is only a third of the one given by Professor Ray Lankester last year)†—namely, that mankind had been upon the Earth 50,000 years—let us find what average yearly increase would produce in that period from an original human pair the population of the world as it stands now—that is (according to the last census for all civilised peoples and according to expert calculations for all barbarous ones) 1,564,000,000.‡

Let $\frac{1}{x}$ stand for the unknown yearly increase. Then every unit in each successive year has become $1 + \frac{1}{x}$; and this process has been repeated 50,000 times.

---

* At the meeting of the British Association, in a discussion upon a paper by Dr. Arthur Evans upon the Chronology of Crete.

† In his Romanes lecture.

‡ From Pannell's *Reference Book* (Granville Press, 1906).

Thus the equation runs—

$$2\left(1+\frac{1}{x}\right)^{50000}=1{,}564{,}000{,}000$$

$$\left(1+\frac{1}{x}\right)^{50000}=782{,}000{,}000$$

$$\log.\left(1+\frac{1}{x}\right)=\log.\,782{,}000{,}000\div 50{,}000$$

$$=8{\cdot}8932068\div 50{,}000$$

$$=0{\cdot}000177864$$

$$1+\frac{1}{x}=1{\cdot}00040906$$

$$\frac{1}{x}=0{\cdot}00040906$$

$$=0{\cdot}409 \text{ per thousand per year,}$$

or, say, $\frac{2}{5}$ of a man per thousand per year; which works out to 4·14 persons per thousand in ten years, or would show that only 8·28 more have been born than have died in every ten years—a figure that need only be mentioned to be scouted by every thoughtful mind. On the other hand, taking the interval from the Deluge to be what Ussher's chronology makes it (only with the addition of three years, so as to place Christ's birth in the year of the Egyptian census 8 B.C.) we have

$4{,}000-1{,}656=2{,}344$	years from the Deluge to the Birth of Christ,
7	years thence to the usual beginning of the Christian Era,
1,900	years thence to the last general census,
4,251	years in all.

So, letting $\frac{1}{x}$ stand as before for the average fractional increase per year, and having 8 persons instead of 2 as the number at our starting point, we get the equation—

$$8\left(1+\frac{1}{x}\right)^{4251}=1{,}564{,}000{,}000$$

$$\left(1+\frac{1}{x}\right)^{4251}=195{,}500{,}000$$

$$\log.\left(1+\frac{1}{x}\right) = \log.\ 195{,}500{,}000 \div 4251$$
$$= 8{\cdot}82911468 \div 4251$$
$$= 0{\cdot}0019504$$
$$1+\frac{1}{x} = 1{\cdot}004501$$
$$\frac{1}{x} = 0{\cdot}0045$$

or 4½ per thousand; or 9 persons on an average have been born per thousand more than have died in every successive year since the Deluge, which works out to 92 per thousand in every ten years.* [One may add that the average excess of births at the present time in such European nations as publish returns—namely, all the Central and Western ones and three of the Balkan States—is 10·74 per thousand per year.]†

Professor Wright has also indicated that the sudden melting of the ice heaped up in Europe and America during the Glacial Epoch, where now there is none, would have raised the level of the ocean everywhere 250 feet, and so have produced a world-wide flood. But this melting itself, as our Secretary has through his own and similar researches shown, was produced by a gradual subsidence of the land surfaces, which itself caused the overflowing at least of those vast belts of land that now lie hundreds of fathoms beneath the sea.

Rev. A. Irving, D.Sc.—The Victoria Institute is to be congratulated on the two papers bearing on the relation of the Glacial Epoch to the early life-conditions of Primeval Man, which have come before it in the present session. Here, where geology meets history, everything has a double interest—the scientific and the human; and the usefulness of Professor Wright's paper is the greater, when it is taken in connection with the bibliography of the "Literature of the Niagara Falls," which is appended to it, in which I am glad to see that the work of my friend Professor J. W. Spencer holds a conspicuous place. The fresh and breezy style of Dr. Wright's paper, as he brushes aside the cobwebs of accumulated geologic

---

* The idea of my equations I owe to an article that appeared in the French review, *Les Mondes*, in 1863.

† Calculated from the tables in Bartholomew's *Handy Reference Atlas*.

dogma on the Glacial Epoch and on geologic time generally, is not its least meritorious feature. It seems to me that, to any one not obstinately committed to the views of a school, it must be difficult to refuse to accept most of, if not all, Dr. Wright's conclusions. His remarks on what has recently come to light in connection with the ancient civilisations of Central Asia far back in the remote past, and the relations in which they stood to other primeval portions of the great Human Family, seem to me to add to the human interest of the subject; and the more so, when we recollect that on the other side of the great Thianshan range another ancient civilisation —that of Tibet—was developed, upon which, no doubt, much new light will soon be thrown, as experts get to work upon the magnificent Tibetan library recently presented by the Master of St John's College to the University of Cambridge.

When we piece together the results put forward in the present paper with those obtained by the Belgian explorers and those described by Professor Hermann Credner for North Germany (*Elemente der Geologie*, 10th ed., 1906), we get such a complete picture of the combined action of ice and water in influencing the conditions of life of Primeval Man, as perhaps had never been given before to the scientific world. It is no longer a question of "Ice *or* Water?" (which are, after all, only two different physical conditions of one and the same substance essentially*), but rather a contemplation of the vastness of results achieved by *variations of temperature* over vast portions of the surface of our planet, as these have been determined by *regional oscillations* of level of the lithosphere acting during long periods of time. Dr. Wright's work, carried on in the free scientific atmosphere of the New World, seems to have emancipated his mind from that *slavish literalism* in the interpretation of the prehistoric records of humanity, of which a former President of the Victoria Institute (the late Sir Gabriel Stokes, F.R.S.) used to speak with a sort of contempt, and of which we have had recent reminders in the correspondence-columns of the *Guardian* newspaper, in connection with the Creation-story of Genesis 1. The concluding paragraphs of Dr. Wright's paper justify the remark, that the last word of science on the "Noachian Deluge" has not yet been

* That is to say, they are one and the same chemical body ± 80 Centigrade thermal units per unit of mass.

written ; but that rather, when a systematic geological survey of the Euphrates-Tigris basin shall have been carried out—such as that which has been accomplished in recent years for the Nile-basin under the directorship of my friend Captain H. G. Lyons, D.Sc., F.R.S.—a good deal of what has been written by Professor Driver of Oxford in his work on Genesis (pp. 99–108 of the latest edition) will probably have to be re-written. It would be no compliment to a man in Dr. Driver's position to suppose that he himself believes that in the single paragraph (pp. 102, 103, *op. cit.*) in which he notices Professor Prestwich's views, as they were put before the Victoria Institute some years ago, he has done justice to a paper occupying twenty-two pages of the Institute's *Journal of Transactions*, with the sixteen pages of a closely-printed report of the discussion thereupon, in which many of the foremost geologists of the day took part. Such regional oscillations of level of the lithosphere relatively to the hydrosphere would, in the nature of things, and as shown in Prestwich's great paper on the *Rubble Drift*, be *differential ;* and Dr. Wright's instance of a raised beach 750 feet above the present level of the Black Sea, gives us some indication of the great vertical range of such differential movements, and points as a finger-post to other possible differential movements in connection with the great elevated region of Asia Minor and Armenia, which might give us all we need to enable us to realise the actuality of such a catastrophe as is implied in the Genesis narrative of the "Noachian Deluge," when due allowance is made for those elaborate and hyperbolic habits of expression, on which the author of a recent work on "the Magi"* (along with Sir William Ramsay, LL.D.) has laid special stress, as characteristic of the Oriental mind.

There are two minor points in Dr. Wright's paper open to criticism—(i) his use of the word "cataract" for a waterfall, the former word having been associated for centuries with certain features in the Nile channel, while we are told in the latest monograph issued by the Egyptian Survey Department (1907) that "there is nothing about the Nile cataracts in any way resembling the falls of Niagara or even the falls of the Rhine at Schaffhausen" ; and (ii) it has been shown in the great monograph on the "Physio-

* *The Magi* : *how they recognised Christ's Star*, by Lieut.-Colonel G. Mackinlay (Hodder and Stoughton, 1907).

graphy of the Nile Basin," which (as the result of a twelve years' survey by Captain Lyons and his accomplished staff) will be the standard work of reference for many years to come, that the Nile Flood and its variations depend upon the annual rainfall in the Abyssinian Highlands, and not upon any periodic overflow of the lakes of Central Africa (p. 62). But these are incidental matters, and do not detract from the solid value of an otherwise excellent paper.

From Mr. Henry Proctor, F.R.S.L., M.R.A.S. :—

In Professor Wright's paper on "The Influence of the Glacial Epoch upon the Early History of Mankind," he speaks of centres of high civilization which existed on the earth ten thousand years ago, which is far anterior to the time which the Bible assigns to Adam. But in this connection it is important to note that the Bible nowhere speaks of Adam as the first man, for it is clearly evident that what is called the Elohistic account of creation in the first chapter of Genesis, is quite distinct from the Jehovistic narrative of the advent of Adam contained in the second chapter.

The differences, indeed, are so great that it is difficult to imagine how it could have been believed so long that they were merely two versions of the same account of creation.

For in the first chapter we see that men and women are created (bāra) without specifying the number, whereas in the second account it is first one man only, and subsequently one woman, who are *formed* (asah). In the first chapter they are to occupy the whole earth: to rule, subdue and replenish it; and in the second chapter, the one man Adam is to occupy Paradise, a garden specially prepared by God—"Eastward in Eden." To Primeval Man every tree and herb is granted without restriction, but to Adam, one tree, the tree of knowledge, is forbidden on pain of death. Primeval Man was not restricted to any particular place; all the fruits and animals of the earth were his, by right, as well as the fishes of the sea. He probably lived, according to the geological evidence, in a similar manner to that which we find the aborigines living now, not tilling the soil, but living by hunting and fishing, and on the spontaneous produce of Mother Earth. But, on the other hand, Adam was specially formed and cared for, and specially restricted. God breathed into him "nishmath Khayyim"—the breath of lives, a portion of God's own life, so that he would have

lived "for ever," if he had not fallen from his high estate as a son of God (Luke iii, 38) and partaker of the Divine Nature, and of the "nishmath-Shaddaï," or inspiration of the Almighty. The comparison instituted between him and our Blessed Lord in the New Testament as the First and Second Adams, points to a similarity of purpose in the advent of both. In accordance with this view, Jacob Böhman gives a remarkable description of Adam. "Adam was created," he says, "to be the *restoring* angel of this world. His nature was twofold: *Within* he had an angelic soul and body, derived from the powers of heaven. *Without* he had a life and body derived from the powers of earth. The former was given him that he might be separate from, and superior to, the world. He was endowed with the latter, that he might be connected with and operative in the world.

This conception of Adam as Ben-Elohim, or Son of God, explains the otherwise inexplicable passage in Genesis vi, 2–6 (R.V.).

The Beney-Elohim of this chapter are the Adamic race, the Benoth Ha-adham are the women of the pre-Adamic races. The mingling of races is put as the cause of the great increase of wickedness on the earth. In this chapter we can distinguish four races, viz.:—

(1) Beney-Elohim, or Elohites.
(2) Beney-ha-adam, or Adamites.
(3) The Nephilim.
(4) A mixed race (Hag-gibborim) resulting from the union of the first three.

Adam was the first Federal Head of the human race, just as our Lord was the second. In this sense, therefore, he is the father, and Eve the mother, of the human race.

The expression "mother of all living" (Genesis iii, 20), however, is not a genuine reading, but a gloss, according to Hastings' *Dictionary of the Bible*, article "Adam."

From the hypotheses here indicated, it will be seen: (1) That the Sacred Book is in opposition to no branch of science or to any historical record; and

(2) That the original record in Genesis i, being absolutely dateless, it does not conflict with any discovery, geological, monumental, or otherwise, which has been, or may be made, pointing to an immense antiquity for Man.

LITERATURE ON NIAGARA FALLS.

Gilbert, G. R.

1. *Annual Report of the Commissioners of the State Reservation at Niagara*, 1889, pp. 61–84.
2. *Smithsonian Report*, 1890.
3. *National Geographical Society of the U.S.*, vol. i, Sept. 1895, pp. 203–236.
4. "Rate of Recession of Niagara Falls," *Bulletin of U.S. Geol. Survey*, No. 306, 1907.

Da. Pohlman.

1. *Proc. Am. Ass. Science*, vol. xxxii, pp. 183–202.
2. *Transactions of Mining Engineers*, vol. xvii, pp. 322–338, 1888.

Spencer, J. W.

The Duration of Niagara Falls, and the History of the Great Lakes, New York, Humboldt Pub. Co., 1895.

Geological Magazine, October, 1907.

A still more recent and detailed work has just (1908) been published by Professor J. W. Spencer, of which a *resumé* was delivered before the Geological Society of London in 1907.

Upham, Warren.

"Niagara Gorge and St. David's Channel," *Bulletin of Geol. Soc. of America*, vol. ix, 1898, pp. 101–110.

Wright, G. F.

Ice Age in North America, cap. xii.

"New Method of Estimating the Age of Niagara Falls," *Popular Science Monthly* for June, 1899.

"The Rate of Lateral Erosion at Niagara," *American Geologist*, March, 1902.

ORDINARY GENERAL MEETING.*

GENERAL J. G. HALLIDAY IN THE CHAIR.

The Minutes of previous meeting were read and confirmed.

ELECTION.—Miss Gwendoline Crewdson was elected Associate.

The following paper was read by the Author :—

RESEMBLANCES BETWEEN INDIAN AND JEWISH IDEAS AND CUSTOMS (*with lantern slides*). By Colonel T. HOLBEIN HENDLEY, C.I.E.

THE subject of the present paper is rather of a miscellaneous character. It treats of resemblances between a number of Indian ideas and customs and similar ones which are mentioned in the Bible, whether they relate to the Jewish nation or to the people beyond their borders, with whom the Hebrews were brought in contact, but which are alluded to in the Scriptures. I am aware that many such Biblical ideas and customs have been compared with those of other countries both ancient and modern. Of most of these, however, I do not intend to speak, but I have thought it might be useful, and might lead to interesting discussion if I brought together a few notes upon the subject with special reference to such matters as have come within my own knowledge. It is, perhaps, necessary to state that my own experience was chiefly gained in North India, although my studies, particularly in relation to Indian jewellery, and in connection with the collection of objects for exhibitions and museums, have led me to make researches and inquiries in all parts of the great peninsula, and of the East. I will commence with some remarks upon land.

Love of the land, and especially of hereditary possessions, as well as a keen desire to own it, are common to all agricultural

---

* Monday, 25th January, 1908.

people. The Jew was no exception to this rule, nor is the Hindu. "Zan, zer, zamin" is a Panjab proverb which means that from "Women, gold, and land" arise all evils. The order of the words should perhaps more correctly be "land, gold, and women." The love of the Rajput for his Bhūm, his earth, his heritage, is not confined to him, but is shared by all classes. Even the shopkeeper clings to his shop and his home. Many years ago, when passing through the town of Sojat in Marwar or Jodhpur, I noticed a number of substantial stone shops and dwellings which were securely fastened up. I was told that some years before, their owners, at the time of a great famine, had gone south into Malwa or Central India in search of food, and that no one would dream of touching their property, because it was certain that, if alive, they would return, or, if not, that news would come of them or proof of death which would enable some near relative to claim the heritage. We are thus reminded of the beautiful story of Boaz and Ruth, and of the right of Elimelich, the father-in-law of the latter, who was driven by famine into Moab, where he and his sons died, yet the right of their heirs to the ownership of the field in Bethlehem was recognized after many years. Hereditary lands and rights are highly prized in India. A Hindu zemindar or landholder, in presence of all his tribe, said to Sir John Malcolm that it preceded his sense of religion. He added, "I would turn Mohamedan twenty times before I would sell my 'Wattan,' or native right," yet it was held to be meritorious to give land in perpetuity to priests, and this was done in such a way that it could not be resumed, for priestcraft is even more powerful in the east than in the west. Villages have been overwhelmed in the savage wars which have prevailed in India, particularly in the seventeenth and eighteenth centuries, or have been abandoned, or the population decimated by famine or disease, yet, even after long periods, have revived once more because the people loved them. I was much struck, when recording the names of a number of unfortunate pilgrims who had been taken out of a train at Jeypore, on account of cholera, which had attacked them at the famous holy lake of Pushkar, near Ajmere, to be told, time after time, that such an one had come from such a village where his forefathers had lived for a thousand years, or, as the lawyers say, beyond the memory of man.

Just outside my garden wall there was a little shrine with a rude figure inside it, before which, night and day, burned a small oil lamp, which was kept alive by the villagers who dwelt

close by, because it represented a man whom they revered, as he had died in defence of his rights in the land. He was the Bhumia or freeholder, and some thought that if his spirit had not been propitiated it would have haunted the village to the injury of its inhabitants. In one of the outside walls of the ancient Jain temple at Sanganir near Jeypore is a huge block of stone which stands in a niche. It represents the Bhumia or original lord of the soil, who had to be recognized, and his name kept alive by being duly propitiated, before the heretic Jains were allowed to build. Examples of this kind are innumerable. The inviolability of land is illustrated by the pains and penalties which were attached to the removal of landmarks. "Thou shalt not remove thy neighbour's landmark, which they of old time have set in thine inheritance" (Deut. xix, 14) says the Lawgiver. "Cursed be he that removeth his neighbour's landmark," said the people on Mount Ebal (Deut. xxvii, 17). The Wise Man (Prov. xxiii, 10), says, "Remove not the old landmarks and enter not into the fields of the fatherless," and again, "Remove not the ancient landmarks which thy fathers have set" (Prov. xxii, 28), yet Job asks why some remove landmarks, "seeing times are not hidden from the Almighty" (Job xxiv, 10).

In the British Museum there is a group of boundary stones or landmarks which probably belonged to the period that lies between 1300 B.C. and 850 B.C. The inscriptions on some of these stones record transfers of land, and also, in some cases, battles or wars which resulted in the grant of certain privileges which are duly recorded, but there are particular imprecations, in which the gods are made to curse "him that shall remove or destroy this landmark, or who shall raise any dispute concerning the property of the rightful owners." There are also certain astronomical marks regarding which there is some difference of opinion. Landmarks of this kind exist in India, more usually, however, in connection with temples. Outside the temple of Pataliswar, the Lord of the lower world, or, in other words, of Hell, whose toenail (which projects from the Brihm Kār, a cleft in a huge rock on the floor of the shrine) is the object of worship, there is such a mark, with horrible sculptured figures undergoing indignities to which the person who resumes the soil by which the temple is supported will be subjected in this world and in the next. In the latter, it is added, his soul will spend 60,000 years in Hell as a worm in mire. The Sun and the Moon at the top of the tablet, just as in a Babylonian Boundary stone of King Nebuchadnezzar I.

(about 1120 B.C.), illustrated in the Museum catalogue, are figured as eternal witnesses of the grant and of the horrors attached to a breach of it. Such witnesses are commonly carved on the stones which are the memorials of *satis* or of the immolations of faithful wives of Rajputs. They are to be found outside the villages or in the *Mâhasatis* or "abodes of bliss," that is, the cemeteries of great chiefs.

Political officers are frequently employed in settling disputes which occur between places on the borders of two states regarding the boundaries of estates or of villages. Crops are sown, it may be, on disputed lands, in consequence of which quarrels arise, ending too often in bloodshed. In former times a raid or a war between the two powers concerned might probably have followed; in these days the Paramount Power steps in and defines the border. The settlement is not always easy. Sometimes the evidence of the village elders suffices. At others, after solemn oaths are taken by such persons, the bounds are walked, but, in whatever way the final conclusions are arrived at, it is necessary to erect boundary stones which from that time are recognized. Removal of such pillars is not unknown, but in these days of accurate maps is not very judicious.

The gate sockets of ancient Babylon, some of which date as far back as 4500 B.C., though not exactly boundary marks, serve as records of the dates of erection of the buildings of which they form part. As a proof of the antiquity of practices in the East, I might note here that some of the doors of the old Garden House of a former Prime Minister, the Nathani-ka-bagh, in which I resided in Jeypore, moved on such sockets as that which supported the gate of Entemena, Governor of Shirpula or Lagash in ancient Babylonia about 6,400 years ago, and which is now in the British Museum. The most common cases of litigation amongst villagers in Malwa, says Sir John Malcolm, are about boundaries and claims to land. "Oaths, ordeals, and every mode is resorted to, to accommodate or decide these disputes." An account is given of a boundary settlement. Each side in turn had driven cattle to graze over the disputed fields. Each chief had piled up small heaps of stones at the most distant line from his own village to indicate the tract he claimed. It was agreed that each side should produce five men acquainted with the local merits of the case to decide a true line by taking a solemn oath. Each side walked its own line. After this failure the parties agreed to accept as the line that which should be traced by a respectable man wearing the hide

of a newly killed buffalo. He took a new line and this was accepted. That was the most solemn appeal which can be made in such cases. The man, however, is watched, and also his family for several days, and if anything which was healthy at the time dies before the fixed period, the man is disgraced, and the settlement rendered null and invalid. This practice is common in East and West Malwa. In native rule a Panchayet or Council of Elders of the neighbourhood usually settled the matter. In our time Political officers act or supervise. In Rutlam this duty is deemed hereditary, and one principal resident or *Mukh* was so respected that his house became a sanctuary for criminals.

Land of any kind which will grow anything edible by men or animals is of value, but for permanent habitation a well is almost a necessity, though not absolutely so, because there are many places in the extreme west of Rajputana which depend almost entirely during the dry months upon the water reserved from the rainy season of the year. In such places, even where there are wells, they are some hundreds of feet in depth. Bikanir water, for example, is as much as 300 feet below the surface, but is then abundant in most cases. Wells are, therefore, most valuable possessions, and many are the quarrels which arise in connection with them. The Philistines, envying the prosperity of Isaac, filled up the wells which his father Abraham had excavated, and the new ones which his servants digged were the subject of strife with the herdmen of Gerar, who said, "the water is ours."

In those parts of Rajputana in which the water lies at a great depth, a well is often the property of a number of men, perhaps as many as sixteen and even twice that number, each having his share. It is easy, therefore, to see how readily disputes may arise if one of the partners endeavours to use more than his share for the irrigation of his field. In more favoured countries the value of a well is not so highly appreciated. It is said that one of the great wells in the city of Bikanir may cost as much as a lakh of rupees or £6,666. The water of such a well as this is too expensive to use for irrigation, so that the people must depend for their crops upon the seasonal rains, which are often very scanty. Abraham and Lot were compelled to separate because their herdmen strove when the land was not able to bear them; in other words when there was not enough water. In like manner, the scarcity of water in the regions to which I have referred in the Western tracts of India, drives many young

men into the ranks of the Native Army, and thus the pressure on the wells is relieved.

We have, in the regulations of the year of Jubilee, full recognition of the inviolable heredity of land, under which every man came into his own again. It would be fortunate if land in India could be redeemed in a similar way, as the Jubilee regulations were wonderfully well adapted to check the improvidence and extravagance of Orientals, who, in times of scarcity or of difficulty, or in order to meet their views of the demands of honour, or more correctly speaking pride, at times of marriage or for funeral feasts and such like emergencies, will mortgage or sell nearly all they possess in order to raise money. Improvidence of this kind is too often encouraged by the money-lender, and not unfrequently under British law ancient families are ruined, and, it is to be feared, are often rendered disloyal, because they attribute their downfall to the Government, which, in the East, is held responsible for everything. The real blame is, of course, due to the causes which I have mentioned, and to the cleverness with which our laws are worked by the unscrupulous. Under native administrations the money-lender dare not claim too much, and in one state, with which I am acquainted, he is checked by the existence of a regulation that will not allow him to recover from the heirs of an estate, on the death of its owner, more than a certain proportion of its value, I think about 5 per cent. A year of Jubilee would certainly make it impossible to obtain heavy loans, especially when the year of redemption drew nigh, and would put an end to much extravagance. The Sabbatical year of the Jew had, moreover, much the same effect as a rotation of crops of allowing land to lie fallow at suitable intervals. In India the village system of agriculture has much the same results.

Very little is said in the Bible about house property, but there is a curious text in the Book of Job which interests me. Amongst the wicked are those of whom it is said, "In the dark they dig through houses, which they had marked themselves in the day time: they knew not the light." (Job xxiv, 16.) One day I went into a picture-dealer's shop, and found him in great trouble. He said he had been robbed of all his savings and of much of his stock, and he pointed to the back wall through which a great hole had been dug by which the thieves had entered. Surgeon-General Bellew tells us that this is a common practice in Afghanistan, and that if, as sometimes happens, the thief is caught while he is entering the room

backwards through the hole, his comrades outside cut off his head, if it is possible to do so, lest he should be recognised, and his family disgraced.

The subject of idolatry and images is a very large one. I shall say very little about it, but some things which I have noted seem worthy of record. Perhaps the best description of the making of an idol is that which is given in the 13th Chapter of the Book of Wisdom in the Apocrypha. We there read as follows: "When he giveth it the semblance of the image of man, or maketh it like some paltry animal, smearing it with vermilion (rouge in the margin) and with paint colouring it red, and smearing over every stain that is therein, and having made for it a chamber worthy of it, he setteth it in a wall, making it fast with iron." While this description is correct in all points, especially as regards the shrine or niche, which is often far more handsome than the image which is placed in it, I am particularly impressed with the mention of the colouring.

In the Jeypore Museum and its corridors we had the greatest difficulty in preventing visitors from smearing with vermilion any old piece of carving which bore semblance in any way to an idol, even if it were a Buddhist or Indo-Scythic king, and then from bowing to it in veneration. The desire to adore something tangible seems to be inherent in the minds of all Hindus of the lower classes. The higher and more learned explain that the symbol is nothing without an elaborate ceremony of consecration with much ritual, in which the deity is respectfully invited to take up his residence temporarily in the image, or it may be permanently. Chapter 14 of the same Book of Wisdom, describes how, "when men could not honour their princes from afar, they made a visible image of the king whom they honoured, that by their zeal they might flatter the absent as if present." In many Indian courts the portrait of the chief is so honoured to this day, being placed on a dais, not as a mere representation of him, but to be revered by an obeisance as if to himself, as if he were present in person. The ritual of Hindu worship is extremely elaborate and burdensome.

No fewer than sixteen different *upacharas* or ceremonies are performed at the worship at a temple, morning, noon, and night. These are as follows:—

Avahanam. Respectful invitation of the god to be present.

1. *Ásanam.* Offering a seat and flowers.

2. *Swágatam.* Welcoming: offering fresh fruit.
3. *Pádyam.* Washing the feet.
4. *Argham.* Pouring water over the head of the image.
5. *Achamaniykham.* Giving the idol water to sip.
6. *Madhuparkam.* Offering curds, honey, and clarified butter with water to sip.
7. *Snánam.* Bathing with water, milk, curds, clarified butter, honey, sugar, and again water; with perfumed oils and powders, and once more pure water, and with perfumed water, sandalwood paste and flowers, concluding with carefully wiping the image.
8. *Wasanam.* Offering clothes and rich dresses.
9. *Abharanani.* Offering gold ornaments, jewellery, etc.
10. *Gandham.* Offering perfumes and sandalwood paste.
11. *Pushpam.* Offering flowers, garlands, etc.
12. *Dhupam.* Burning incense before the image.
13. *Dipam.* Offering a lamp fed with clarified butter.
14. *Nairedyam.* Offering food.
15. *Vandanam.* Obeisance before the image.
16. *Pradakshinam.* Turning round and round the image.

Namaskárah. Obeisance and respectful homage, and *Wisargah*, or giving leave or sending away the deity to its place.

In a permanently consecrated image, because the deity is supposed to be always present, neither respectful invitation nor dismissal are required. I have often seen aged Indian friends performing these ceremonies with the aid of a Brahman priest, rising at 3 or 4 o'clock in the morning, and taking two or more hours for the service, working out their salvation with fear and trembling, at all seasons of the year, thus setting us all a great example in devotion.

No Jewish ritual was so severe as this, even in the great temple itself. One of the greatest attractions of Christianity to such people as the Hindus should surely be the simplicity of our normal services.

The Roman ritual seemed at first to commend itself to the Hindus of South India, but, in most cases, the practice of the Christians of that church in those districts appears to have become as formal and as little impressive as are the ceremonies of Hinduism itself. Such are the dangers which are apparently inseparable from all elaborate forms of worship. One point to be commended in the case of the Hindu priest is that he devotes all his efforts to his god and its shrine. As far as my

observation goes, he does not seek to glorify himself, or his office, by the use of gorgeous vestments or ornaments for his own person. On the contrary, he divests himself of such adventitious and superfluous assistance. It may be asked whether the belief in idols and in their religion by Hindus is sincere? There can be no doubt of it in many cases, and their beliefs seem often to be strengthened by events as, for example, when Sultan Mujahid, Shah of Gulbarga, slew a number of Brahmans, who took refuge in a shrine of Hununan (the favourite monkey god), he himself struck the image in the face with his battle-axe, mutilating its features, whereupon a dying Brahman, with his last effort, rose up and exclaimed, "For this act you will never see your kingdom again, and will not return to it alive," a prophecy which proved to be only too true. The late General Brooke told me that, when he first went to Mount Abu, fifty or sixty years ago, an Englishman, on being informed that no kine could be killed upon the sacred hill (*Arbudha*, the Mount of Wisdom), defied what he considered to be foolish prejudice, and caused a calf to be slain in his own grounds. That night there was an earthquake, and the dome of the great Jain temple at Dilwara on the mountain, which had stood more than 900 years, cracked across, because the cow on which the earth rests was angry.

The officer fled for his life. This was certainly an extraordinary coincidence, though some might think it was the work of the devil, who was permitted long ago to display his power in the case of Job.

Just before I went to Jeypore the priests of one of the principal sects persecuted their rivals who had long been in power. The former succeeded in turning out the latter, and they left the city headed by their pontiff. That personage, who was a priest of Vishnu, solemnly cursed his Sivaite enemy, saying that, although he would be enriched as he wished to be, he would die of hunger and thirst. This curse so weighed upon the mind of the unfortunate Brahman that he imagined that he was always full of food and drink, and feared to take any more, and in the end he died of starvation, a prey to his own superstitious fears.

Is belief in idols incompatible with modern education? Not even generally so perhaps. The present High Priest of Kali in Calcutta had an English education up to University standards, and wrote a useful pamphlet on plague, in doing which he afforded much valuable assistance to my department in allaying the fears of his countrymen. On the other hand

every one knows that in this priest's shrine enormous numbers of animals are sacrificed to the goddess Kali or Bhavani, the favourite deity of the Bengalis.

I think that many of our ideas connected with sacrifice are erroneous. As ordinarily practised it is devoid of cruelty. The head of the victim must be cut off with a heavy sword at one blow. I have several times seen goats sacrificed at Amber, the ancient capital of the Jeypore state. At the appointed hour the person who made the sacrifice stood in front of the image sword in hand. The goat was then led in by an attendant. It was usually decked with a garland of flowers, and was happily eating some food. It was placed in the proper position, and then suddenly, with a single blow of the sword, its head fell, and with the blood, which was dexterously caught in a bowl, was placed before the idol. The rest of the body was taken away to be used as food. At the Durga Puja, or Festival of the goddess Durga or Kali, on one of the principal days many animals are slain. The young Rajput nobles show their prowess before their chief by cutting off the heads of buffaloes. Any man who fails to sever the head of the huge beast at one stroke, spoils the sacrifice, and disgraces himself. Perhaps no other mode of killing an animal is so devoid of cruelty. There are, however, cruelties attached to sacrifice amongst the wild tribes, as to the manner in which it is done, and there are also, in all parts of the country, objectionable ideas connected with it, as, for example, human sacrifice, which was common enough when Hinduism was unchecked; and the familiarity with blood which accompanies the universal practice of the rite is in itself most harmful. It must not be forgotten that Mohamedans also sacrifice on certain occasions.

I now turn to the scape-goat. We are familiar with the Jewish ideas on the subject. There is a general belief that disease is the result of (1) a man's own sins in the present life, (2) of his sins in a previous birth, and (3) of the sins of his parents. With the position of the physician in respect to these opinions I shall have more to say later on. Associated with the subject there are, however, two further ideas, viz., that a disease of the body, and the sin which caused it, may be transferred to an animal which becomes a scape-animal—usually a bull or bull-calf—or secondly, that it may pass into some other object through which it may be transmitted to some other being.

I was present with Maharaja Takht Singh of Jodhpore during the performance of many such ceremonies which took

place in the last few days of his life in 1873. Amongst them was that of Vrishotsarga.

A young bull-calf was brought into his bed-room and was waved over the dying chief with certain rites, and was then removed, to be allowed to wander about unmolested and unappropriated, to become what Englishmen call a "Brahmani bull." The Maharaja, thinking I was surprised, said, "I am afraid it will not do much good. It was different some years ago when I was very ill. At that time a strange *Sunyasi* or devotee appeared on the stairs, and demanded to be waved over my head because he was prepared to take my disease upon himself. It was done, and he disappeared, and I recovered. He was never seen again." "Who was it?" said I. "Men said it was the god Siva," he replied. These animals often become dangerous. They help themselves to corn and vegetables at the shops, fight together in the streets and sometimes gore and even kill people. So troublesome had they become on one occasion in Jeypore, that the chief caused them to be confined in an enclosure where they were well fed. Unfortunately, little rain fell that year, and the people murmured that it was due to the impious act of their Maharaja, who had to yield to the popular clamour and set free the beasts. According to the original idea the animal was set free in the *jangal* or wilderness.

The second idea is, that if garlands are placed for a time round the neck of a sick person, and are then removed, and are thrown into a public place, preferably at cross ways, passers-by may pick them up or tread upon them, and in that way the disease may be transferred. As this is done in small-pox cases, for example, even if the disease is not passed on, the intention of the persons who are interested is most abominable.

It will be seen that there is a difference between the Jewish and the Hindu scape-goat. In the former case it was an atonement for the whole people, but the goat was unclean, and the person who led him away required purification. The Hindu ceremony is for the benefit of a single individual. In numerous places in the Bible reference is made to disease being sent by God as punishment, as for example in certain of the Egyptian plagues, which He promised "should not afflict the Israelites if they did that which was right and hearkened to his voice." Miriam, Gehazi, and Uzziah were struck with leprosy as a punishment for sin. Jehoram was smitten with an incurable disease on account of his wickedness. Job, the righteous, was, however, afflicted in order to test his upright-

ness. The connection between disease and sin, and the general belief in that view are, perhaps, more exactly expressed in the case of the blind man in St. John's Gospel. The disciples asked Jesus, saying, "Master, who did sin, this man, or his parents, that he was born blind?" Hindus believe, as I have already observed, that disease is usually the result of sin in the sufferer or in his parents, or again in the individual in a previous birth—so that we have ideas of personal wickedness, of heredity, and of transmigration of bodily as well as of mental defects. The practical result is the same. The priest comes before the physician. As priest he must endeavour to propitiate an injured deity by charms and ceremonies, in the hope that he will heal the patient, thus showing his forgiveness of him. If these measures fail, it may then be considered that the disorder may not be wholly due to sin, in which case the physician may at last prove useful. Even while he is treating the case his efforts are likely to be frustrated by the intervention of the priest.

The Mosaic laws regarding disease and its treatment point to the priest taking the first, if not the only, place in the treatment of disease.

The New Testament seems to give some place to the more modern conception of the use of a physician, although the Apocrypha in Ecclesiasticus shows that in earlier times he was held in some honour, and that his medicines were valued. It will be remembered that the Asclepiads, the descendants of Asklepios (*Æsculapius*) the Greek God of medicine, were priests as well as physicians, and amongst them was Hippocrates, the father of medicine himself.

The cities of refuge for him who killed his neighbour ignorantly were of great importance in Jewish times, and similar places to which men might flee for protection under analogous circumstances, were provided by the Church in Europe in lawless times. The Broad Sanctuary in Westminster is a reminder that here in London the need and remedy remained until quite recent times. There are certain holy places, such, for instance, as the tomb of the Persian saint, Imam Reza, at Meshed and its vicinity, where sanctuary is still afforded in Mohamedan countries. In India, in Rajputana, and in Malwa every noble claimed and, until recently exercised the right of *sirna* or sanctuary, and it was much needed in many cases, for blood feuds were common, and the avenger was often on the track of the homicide. Amongst the Afghans or the Pathans of Kabul and the Panjab, however,

such feuds were more common and were pursued more bitterly, until sometimes it was hardly safe in a village for men to plough the fields, and they always did so with weapons in their hands, and there were convenient towers in which they could take refuge when the alarm was raised.

Domestic slavery was another recognized institution amongst the Jews, and even a Hebrew bondman could remain as a permanent servant if he should say, "I will not go away from thee, because he loveth thee and thine house, because he is well with thee," and he submitted to have an awl thrust through his ear. The book of Leviticus, moreover, indicates how much more stringent the laws concerning foreign bondmen were than those which applied to such as were Jews. Domestic slavery in India partakes rather of the character of the latter class. Sir John Malcolm, in his *History of Malwa, or Central India*, sums up the case for that country and indeed for Rajputana also.

He says:—"Slavery in Malwa and adjacent provinces is chiefly limited to females, but there is perhaps no part of India where there are so many slaves of this sex. Few Rajputs, Brahmans, and even few merchants are without such slaves. Male slaves are rarer and never seen but with men of some rank or property, with whom they are usually the confidential servants. Many of these slaves date their condition from a famine or scarcity. In the famine of 1813–14 Amir Khan of Tonk formed a battalion of children and youths of this class chiefly from Marwar in Rajputana. They were sold by their parents on account of the oppression of the Mahrattas, as they often are in famine not only to save their children but themselves.

"Rajputs may, under stress, sell their children by slaves. An enquiry is usually made as to their tribe, and the Gwarriahs, who import them, or the Brinjaras, usually say they are Rajputs or Brahmans. They are not usually treated with cruelty. It is not the master's interest to be so, because escape is easy." The practice of infanticide of female children amongst Rajputs in North India led to such a scanty supply of women that many men were glad to purchase children from the dealers to serve as wives for their sons, and would ask no questions about their origin. Such alliances avoided the heavy expenses attending marriages which were the true cause of the evil for which purchase was a substitute. Happily reforms are taking place in this matter. In every Rajput family there are *chelas* (an euphemism for male slaves as the word means

a disciple or pupil) and *bāndis* or female slaves or hereditary domestics, whose fortunes are bound up with those of the family in which they serve. When a daughter of the house is married young *chelas* and *bāndis* accompany her to her new home, and are married at the same time as herself to the handmaids and boys who are in a similar position in her husband's family. It must be remembered that in an Indian conjoined family the pleasures and sorrows, the feastings and the privations are shared by all, and thus the evils attending the condition of the servants are much modified or mitigated. Allowing for differences of rank and position in those respects all were very much alike.

The present Maharaja of Jeypore, who in his early days was far from prosperous, told me that when he himself suffered many privations, his *chelas* never felt them. It was a point of honour to ensure their comfort before his own. The position of men of this class is similar to that of Eliezer, the steward of Abraham, "in whose hands were all the goods of his master." Amongst the Mohamedans there were dynasties of slave kings as, for example, that which ruled from 1206 to 1287 at Delhi from Kulb-ud-din-Aybak, the general of Mohamad Ghori, onwards; and in the time of the Bahmani kings in the Deccan, who were dispossessed of part of their dominions by the descendants of one Bidar, who sprang from a Georgian slave. They ruled from 1492 to 1609. Are not also most of the Sultans of Turkey the sons of slavewomen? In Persia we have the Tahirīds of Khorasan who were of slave origin. In that country many men of the slave class still arrive at great honour. The position of slavewomen everywhere is by no means so satisfactory, nor does it appear to have been much better amongst the Jews. In India, however, it is comparatively easy in our time for all persons of this class to escape if they wish to do so. Josephus notes a common cause of slavery. He says that if a man could not pay the fine to which he was condemned for stealing cattle, etc., he became servant to him to whom he was adjudged to pay it for six years. If he had a son by a woman servant in his master's house he might, if he willed, remain servant still until the year of Jubilee, when he could also take away his wife and children.

One of the most persistent of all beliefs in the East is that of firm confidence in the existence and powers of witches, wizards, charmers, and astrologers. The following are some of the Biblical texts which relate to the subject. (Exod. xxv, 18):

"Thou shalt not suffer a witch to live." (Levit. xix, 26): "Neither shall ye use enchantments or observe times." (Deut. xviii, 10–12): "There shall not be found among you. . . . an enchanter, or a witch, or a charmer, or a consulter with familiar spirits, or a wizard, or a necromancer, for all that do these things are an abomination unto the Lord." We are all aware that in our own country, until quite recent times, such beliefs dominated the minds of men; how in the days of James I. five hundred women are said to have suffered for raising the storm which delayed the landing of the wife of that king when she was coming from Denmark to these islands, and how even such great men as Francis Bacon, Lord St. Albans and Sir Matthew Hale shared in the popular credulity.

We must not be surprised, therefore, when we are told by Sir John Malcolm that Zalim Singh, the famous Regent of Kotah, who preserved that state when all others round it were suffering from the cruel oppression of the Mahrattas at the close of the eighteenth century, in only thirty years had put to death a thousand women who were said to be *dákans* or witches. Not fifty years ago the officers of the Meywar Bhil Corps at Kwairwarra were not able to prevent a poor woman from being tortured at the instigation of a *Bhopa* or witch-finder. Red pepper was put into her mouth and eyes, and she was swung, head downwards, from the tree. This was done at the other side of a stream in flood which the officers could not cross. A few years later I met an old man fishing in a river close to Khairwarra, who said that he was an outlaw as a suspected *Bhopa*, who could no longer get employment, and was discredited. Times had indeed changed since, on the word of such a man as he, women could be tortured as I have described or flogged with castor oil plants, or tied in a bag and thrown into a pool to see if they would sink or swim. The belief still remains in witches and in other mediæval practices—such as the evil eye, or in the power to cause disease or death by thrusting pins through the wax model of an enemy, and in many similar abominations, and would be carried into action if the restraining arm of the law were not feared. It is well known, I believe, to most students of Hinduism, that even worse practices, such as Sati for instance, would soon be universally revived if British influence were withdrawn. I think, therefore, that I am justified in dwelling upon the persistency of ancient ideas in the East. Custom is indeed wonderfully persistent even in small matters It is said that it occurred to someone quite recently to enquire why

a sentry was posted in the midst of a lawn in front of one of the Czar's palaces. At last it was ascertained that more than a century ago, if I remember correctly, the great Empress Catherine happened to notice that a snowdrop grew on that spot, and told some one to see that it was not trodden upon. A sentry was placed in order that it might be preserved, but a guard was still posted in our own days to carry out a duty which for so many years had been impossible. Naushirvan the Just, King of Persia at the time of the Emperor Justinian, in whose days Mohamed boasted that he had been born, refused to permit his followers to take a handful of salt from a village lest it should become a custom, and so the place be ruined. His fame, on account of this and similar acts, is still known throughout the East.

About forty years ago the wife of a sick officer who lived at the capital of a native chief expressed a wish to have a pet rabbit sent to her to the hills from her home in the plains. The prince at once ordered that her wish should be complied with, but long after she had left the world a yearly box of rabbits went up to the same place by special messenger, though who received them I do not know. It was the interest of someone to keep up the custom. A tax denominated Ghora-berarwa was first levied by Madhoji Sindiah from the country of Meywar to remunerate him for the price of one of his favourite horses that died within the limits of that province. This amount was long afterwards assessed as a part of the revenue. (Malcolm.)

In 1805, when Jaswant Rao Holkar was in pursuit of Lieut.-Colonel Monson's Corps, the death of numbers of his gun bullocks led him to levy a contribution of one bullock each from many villages. The tax did not cease with the emergency, but it was commuted for money, and for many years was still paid by each of these villages under the head of *Top-khanah-karich*, or charge for the train. It may be paid to this day. Dastur or custom is, and always was, a ruling principle in the East, and applied to the Jew and to the ancient nations as much then as it does now to their descendants.

The Jews were forbidden to observe times and seasons and consult soothsayers. It is hard to distinguish the latter from astrologers. Many references to the stars in the Bible are undoubtedly astrological, as for example, when the Lord is represented as saying in Job, "Canst thou bind the sweet influences of Pleiades, or loose the bands of Orion" (Job xxxviii, 31). In Isaiah xlvii, 13, the daughter of Babylon is

asked whether the astrologers, the stargazers, and the monthly prognosticators could save her from the things that should come upon her. The forbidden practices were the fashion and belief in our own Middle Ages. Are they neglected now? All through India the horoscope is the guide in life for every Hindu. Marriages are fixed by it. No journey is undertaken without consulting the stars, or the omens being taken. *Thags* or professional stranglers, and *Dakaits*—or highway robbers, took the omens or consulted the stars before they started on their expeditions. Every action in life for many people in the world depends upon astrology. The horoscope of a chief or noble or great man, may be 20 or 30 feet long, and should be constantly kept up to date. Trial by ordeal was not unknown amongst the Jews, as in the case of the jealous husband. In Malwa appeal to it by an accused person, was allowed. Generally, according to Malcolm, "this required putting the arm into boiling oil or water, or having a red hot iron placed in the hand, the leaf of the sacred pipal tree (*Ficus religiosa*) being first bound upon it. If the man was scalded he was guilty. By art or collusion escapes sometimes occurred." Many of the minor Levitical regulations, as for instance, on sanitation, ceremonial cleansing, or the marriage laws, might be discussed and parallel illustrations given from Indian practice amongst not only Brahminical Hindus but Mohamedans; but the subject is too wide for the present paper.

I shall only advert to a few points. In our Bibles we read that "the newly married man shall not go to war, neither shall he be charged with any business for a year, but he shall be free at home for one year, and shall cheer up his wife which he hath taken." The faint-hearted were also told to stay at home. Josephus, however, in his book against Apion, has a slightly different version, as he couples the two classes together. He says, "Leave in wartime was given to continue in their own country to several classes of men, amongst them being those who have betrothed or lately married wives, lest they have such an affection for these things that they be too sparing of their lives, and by reserving themselves for those enjoyments, they become *voluntary cowards*, on account of their wives!" I had a striking proof that this practice is in accord with Indian views.

My brother, being on active service in Burmah when his future wife arrived in India to join him, the Maharaja of Jeypore, on hearing of his dilemma, asked me why he could not come, because, he said, "it is the invariable

custom amongst us to grant leave at least for a year under such circumstances."

Josephus also, in the second book against Apion, refers to the care which was taken by the Jews for decent burial of the dead without extravagant expense for funerals, and without the erection of any illustrious monuments for them. The nearest relations should perform the obsequies, but all that pass by should accompany the funeral and join in the lamentation. However, in his "Antiquities of the Jews" he narrates the particular care of Archelaus that the procession of the body of his father, Herod, to his sepulchre should be very sumptuous. "Accordingly he brought out all his ornaments to adorn the pomp of the funeral. The body was carried on a golden bier, embroidered with very precious stones of great variety, and it was covered over with purple, as well as the body itself; he had a diadem upon his head, and above it a crown of gold; he had also a sceptre in his right hand."

The bodies of Hindus, with certain exceptions, such as particular classes of *Sanyasis* or devotees, and children who die of small-pox, are cremated; but there is a funeral procession to the cremation ground, at which as many as possible attend. In the case of a great man or a chief nearly the whole population will be present. The bodies of deceased rulers, and sometimes those of priests, are carried upright, as Herod's apparently was, in a chair of state, and are decked with jewels. It was in this manner, arrayed as if yet alive, that I saw the body of Maharaja Takht Singh of Jodhpore, borne for the last time down the slopes of the rock fort of his capital. Priests, with their hair unbound, ran before the corpse; bards proclaimed his titles; and the people of the city went with the throng to the old capital of Mandore where he was burned. On this occasion every Marwari trader from Zanzibar to Hong Kong, and in all parts of India, shaved in honour of the deceased. A native gentleman heard of his father's death in a distant town in which he was chief priest to a small raja. He was unable to be present, but was kept fully informed by telegram of all that transpired. At one telegram he was much incensed, because the family insisted in having the departed carried in a sitting posture in the funeral procession, on the ground that the chief himself would be present. My friend objected to the increased cost, which he said was due to the foolish pride of his relatives, pride from which he himself was emancipated, and because they did not reflect that the extra expense would fall upon him. Judges amongst the Jews were

specially warned against gifts or bribes, "For a gift doth blind the eyes of the wise, and pervert the words of the righteous." The proverb also says, "A wicked man taketh a gift out of the bosom to pervert the ways of judgment." It is hardly necessary to notice the universal prevalence of this vice in the East, but, perhaps, it may be worth mentioning that many years ago I was told that a certain judge in a Native State showed bad form in this respect, because he kept the gifts of both parties in suits in his courts, whereas the etiquette was to return that of the defeated party. There were said to be only three persons in that state who never took gifts. The custom was universal as we know, even amongst Europeans in India, as it was in their own countries. Of the Portuguese Viceroy, Dom Vasco da Gama, Conde de Vidigueira (1524), however it was said that "many persons went to him with offerings, such as it is customary to make to governors when they arrived; he would not take anything from Christian or Moor, and still less from this city (Goa), which we all look upon as extraordinary, as it is the custom for all to be accepted."

It was formerly customary, as it was amongst the Jews, in British India, and it is so still in the Native States, for officials and servants, and for inferiors, to present gifts to those who were above them, or to those whom they wished to propitiate. The superior, as a rule, returned far more than he received, either in the form of a Khilat, or dress of honour and ornaments, or in pecuniary gifts on marriages or on other similar occasions, but the British Government, finding that much money was wasted on what were really ceremonies, though they might be mistaken or even abused by some, and because such gifts were burdensome, put a stop to the custom. It is still permissible, however, to offer gifts of fruit and flowers, but even this old world practice is gradually falling into disuse. There is, however, one rather interesting survival. The native officer in our army at a levée, or on a similar occasion, still presents his sword to his superior, thereby indicating that his services and his devotion are at the disposal of his king and his representatives. The weapon is touched in token of approval and acceptance of the offer. The Indian chief accepts gold and silver coins at Durbars, and keeps them, because they are an acknowledged portion of his revenue.

The Oxford *Helps to the Study of the Bible*, under the head "Adoption," observe that St Paul, in his use of the word (Rom. viii, 15; Gal. iv, 5), probably refers to the Roman custom, whereby an adopted child stood to his foster-parents

in precisely the same relation as a child born of a man's marriage. Adoption in this full sense was unknown amongst the Jews. It is precisely in the former sense that adoption takes place in India. It is necessary that there should be a son in order to perform certain funeral rites, or to deliver the soul of the deceased man from the hell called Pŭt; hence if a man has no son, he adopts one from amongst his kin. It is in this way many great families, especially those of ruling chiefs, have been perpetuated. Although there is, therefore, no direct succession in most of the great chieftainships of India according to our ideas, there is, for the most part, the certainty that the blood of the founder of the family will generally be on the throne. If by any chance there should be an intrusion, there is still a strong tendency to revert to the natural line. It will easily be understood that if a throne can be passed on by adoption, ordinary land and possessions would go to the adopted as to the natural son. So truly is an adopted child regarded as a lawful one that, in the event of a true heir being born, the rights of the former are not easily set aside, and he must be provided for in an adequate manner. This difficulty, and the belief that an adopted son may not have the same feeling as a natural one, and that he, or his friends, may even endeavour to make certain what may be set aside, often leads to the postponement of the selection of an heir for so long that it cannot be effectually performed. The omission may be rectified by allowing the widow to adopt, under certain conditions, but it is not so satisfactory. If it had not been for the grant to the native princes of the right of adoption, in my own time a large proportion of the Native States in Rajputana would have become British. St. Paul, indeed, attached the highest value to our adoption as sons, and comparison between Roman and Indian practice in this important matter shows how great the privilege really was—and is.

The subject of charms, amulets, and jewellery is of some interest. I will therefore give a general description of some of the ornaments which are referred to in the Bible, and especially in the Old Testament. I do this because many of the actual examples, and certainly many of the types exist to this day in the East, and particularly in India, in which the customs, practices, and arts of all the nations with which that huge country comes into relation, are absorbed, though, no doubt, they are modified and given a peculiar Indian stamp.

Eliezer, the steward of Abraham, when he first met Rebekah, put upon her a golden earring of half a shekel weight,

and two bracelets for her hands of ten shekels weight of gold. Madden, in the *Cambridge Aids*, says, "it is generally believed that rings and jewels were the currency of the time. The spoil taken by the children of the Midianites included jewels of gold, chains, and bracelets, rings, earrings, and tablets. The Ishmaelites wore earrings; and the Amalekites adorned the necks of their camels with gold chains. Judah wore signets and bracelets. Men wore also official chains." The best list, however, is that which is given in Isaiah iii, 16–23. "The daughters of Zion are haughty," the prophet says, and also "they walk with stretched-out necks, walking and mincing as they go, and making a tinkling with their feet." There are many such tinkling ornaments, especially the *Paizeb*, or foot chains of many links and drops; the *Jhan jhans* or hollow anklets filled with small pieces of metal: the *Gugris* or anklets with hawk-bells and sets of *Karas* or small thin anklets which clank together as the legs are moved. The Indian poets speak of the gait of a fine woman as being like that of an elephant. This refers to the enormous weight of her anklets. A great queen or *Pat Rani*, may wear as much as forty pounds weight of ornaments, and as heavy a load of gold lace upon her skirts, and thus adorned, she may only be able to move with the assistance of her handmaids.

Isaiah goes on to say in the old version of the Bible, "In that day the Lord will take away the bravery of their tinkling ornaments about their feet, and their cauls, and their round tires like the moon, the chains, and the bracelets, and the mufflers. The bonnets, and the ornaments of the legs, and the headbands, and the tablets, and the ear-rings. The rings and nose jewels." I possess portraits of different periods in which ladies are decked out with nearly all these ornaments. They belong to different ages and countries in the East, but they all prove the universality and the antiquity of those ornaments which are mentioned by the prophet. Two portraits of noble women from Palmyra, which are reproduced from their busts which are now in the British Museum, are especially noteworthy. A lady from the Panjab, and another from Oudh, and others from Rajputana will be shown on the screen. The forms of ornaments, such as armlets, bracelets, rings, anklets, necklaces, ear-rings, nose-rings, and other head ornaments are as endless in the East as are their names. Many are symbolic; others are peculiar to certain tribes, castes and districts; others are worn by children, married women, or girls, or by widows, if the latter wear any ornaments at all. Others are used by certain sects

only. Even ascetics have those which are worn only by them, and men wear ornaments to denote their caste, their religion, or their office.

In all, however, there is usually some meaning attached to every ornament, and something to be read in it of history, of art, or of custom. Thus the subject of jewellery is to all orientals one of extreme interest, whether it be for its intrinsic value as capital, or from its beauty, or from its significance as marking position or wealth.

The *Oxford Glossary* says the bracelets and anklets of the Hebrews were never jewelled. Saul had a bracelet which was on his arm. The splendid ornaments found amongst what is known as the "Treasure of the Oxus," are the earliest actual examples of such regal ornaments. They date from about the fifth century before Christ. One or two specimens of modern Indian form, such as are worn by Maharajas, are shown on the screen, and also a few portraits of chiefs who are decorated with them. In Rajputana it is a mark of the highest nobility to have the right to wear an anklet of gold or of enamelled gold. The person, who is so ornamented, is a Tazimi sardar, one for whom the chief rises when he comes into the Durbar Hall. Saul also wore a crown upon his head. Indian chiefs of the present day do not ordinarily wear crowns, though the late Maharaja of Rewah used to do so; but the ancient images of the Hindu God, Vishnu, and also of Surya—the Sun-god especially—are often represented with the head adorned with magnificent crowns. There are fine figures of this kind in the British and Indian Museums, and similar magnificently jewelled head-dresses are still kept in the Madura temples. Moreover the Emperor Jahangir describes a truly regal crown which belonged to the regalia of the Moghuls in his time. The signet ring is, amongst Mohamedans, often their only ornament. As in ancient times our own Indian Musalman soldiers often wear suspended from their necks their signet rings with which they mark the pay rolls. Hindus of rank more frequently have a seal which they do not wear, but keep in some safe place.

Cauls or networks for the head are not common in India, but very elaborate chains and pendants are worn, and old pictures show a kind of network of stars which covers the hair. Round tires or head-dresses are common in the form of plates, jewelled or otherwise, which are round, moon-shaped, or crescentic, such as the Arab Karz or the Hindu Suraj or Sisphūl. The new version of the Bible has indeed "crescents" instead of "tires" like the moon.

Chains, or, as the margin says, sweet balls, which I cannot understand, are common enough. Mufflers, said to be spangled ornaments, are worn on the dress, shoes, etc., in great profusion. The bonnets are described in the new version as being head tires, which have already been described. The headbands may be seen in the portraits of the Palmyra ladies; in Etruscan; and even in modern African jewellery, and perhaps in the head covering or Mathabana of Parsi women.

The earrings are attached to all parts of the ear, and very heavy specimens are supported by chains which cross the head, or they are simulated by pendants which hang over the ear. Rings are worn from both nostrils, and even from the cartilage between them. The nath or nose-ring is sometimes four inches in diameter. It is the sign of a married woman whose husband is alive. Tablets, or "Houses of the Soul," as the margin has it, are amulet cases. They are of many forms, as cylindrical cases or flat boxes in which are placed written papers with some protective holy sentence or cabalistic writing upon them. They are worn from the neck or arms. The Jews must have been very familiar with them, as they were used by the Egyptians in particular in enormous quantities, as well as by all the nations of antiquity. The charms are supposed to protect against every ill, bodily as well as spiritual, as, for example, against diseases and the evil-eye, which is devoutly believed in all over the East.

The new version of the Bible differs somewhat from the old. Pendants take the place of chains; this is immaterial, because pendants of several kinds are in common use, especially in the form of amulet cases. Ornaments of the legs are called ankle chains, and the head-bands "sashes," which is hardly an improvement. Perfume boxes and amulets take the place of tablets and earrings. Many of the so-called charm boxes are indeed perfume boxes, as they are frequently perforated and contain cotton-wool which is saturated with some strong oil or essence as of sandalwood or roses.

Jeremiah says, "Can a maid forget her ornaments, or a bride her attire?" Isaiah says, "He hath covered me with the robe of righteousness as a bridegroom decketh himself with ornaments, and as a bride decketh herself with her jewels." How well these words are understood in the East.

Phylacteries were frontlets of inscribed parchment, wrapped in leather and strapped to the forehead. They are amulets.

Great was the care of the Jew to preserve the purity of his family and tribe. The Hindu is equally solicitous to preserve

his caste. Tobit instructed his son not to "take a strange wife, which was not of his father's tribe." He says, "Noah, Abraham and Isaac, our fathers of old time—they all took wives of their brethren, and were blessed in their children." The difference between the Hindu and the Jew, however, is that the former takes the wife from his mother's, and not from his father's tribe. Tod says, that after one hundred and one generations the marriage of a Rajput might take place in the father's tribe, but, in practice, this means exclusion for ever. The notes on the last Indian census tables contain a great deal of lore upon this subject. I mention it here because it is connected with the practice of excommunication, which was founded upon tradition amongst the Jews, according to the *Oxford Aids*, rather than on definite Mosaic sanction, and was of varying degrees of severity. The Christian community had the right to practise it. In India to be out-casted or "Hukaband," is a far more serious thing, involving complete separation from a man's nearest and dearest friends and relations, as well as prohibition of marriage within his caste; and of participation in all their social pleasures.

As everyone acknowledges, it is the principal difficulty in the way of the conversion to Christianity of individuals, hence some Missions have believed in the efforts for the wholesale conversion of villages rather than in attempts to keep separate individuals from their families.

Sectarian or similar marks are alluded to in Leviticus xix, 28. "Ye shall not make any cuttings in your flesh for the dead, nor print any marks upon you." Hindus not only have sectarian marks to distinguish the worshippers of one god from another, but persons of high caste make numerous marks upon their bodies with ashes or earth.

The sacrifice of Jephthah's daughter on account of her father's hasty oath, is parallel, not only by the case of Iphigenia's daughter, but by the story of a young Indian prince who, having kept back a few minutes to say farewell to his mother, became a victim to the oath of his father who had sworn that if anyone delayed he should be put into a cauldron of boiling oil. Vishnu, the young man's god, is said to have cooled the oil so that no harm was done. There are many such stories in Indian books.

Of miscellaneous matters are the following:—The Jewish prohibition against a man marrying two sisters in the lifetime of both, though not rigidly enforced amongst Hindus, is strongly objected to by many. An old friend of mine, a Rajput

noble, told me that he refused to give a younger sister to a son-in-law, who had already been long married to the elder, on the ground that the latter should not be vexed. The specious reason, which had been given in similar cases, that the two sisters would comfort each other in a foreign country had no weight with him.

The Jewish ideas of defilement in connection with the dead are fully shared by all Hindus, as the following incident will prove.

It was necessary to put up a special notice in the Jeypore Museum warning those who had strict views on this subject, not to touch even the outside of the closed case in which there was an Egyptian mummy, lest they should think they were defiled. I have known a case in which, after seeing a mummy at the end of a long corridor, the spectator went home and washed.

The illustrations which I have been able to give to-day may make us thankful that we are free from many of the obligations which weigh so heavily upon our Indian friends, and with which the nations of antiquity were so grievously burdened.

Discussion.

Lieut.-Colonel G. Mackinlay.—I beg to move a vote of thanks to Colonel Holbein Hendley for his interesting paper, the part on Indian jewellery being excellent.

Referring to the paper before us, second half of page 80. The pivot and socket arrangement seems to be referred to in Prov. xxvi, 14, "As the door turneth upon its hinges, so doth the slothful upon his bed." I have lived for a few days in a wooden house in Gulmurg in Cashmere, which had small folding doors, each made of a slab of wood (the width of a tree) with projecting pivots, all in one piece; these worked in wooden sockets. The plan had probably been employed because metal was evidently scarce when the house was built, it was doubtless the same as that adopted in the very ancient small wooden doors from which *afterwards* the gates of Babylon with their metal pivots and sockets must have been evolved.

On page 81, the reference to water reminds us of the method of irrigation in Egypt, see Deut. xi, 10, in which the land is described as watered "with thy foot"; the same method may be seen in the Punjab to-day.

Many of the habits of the East referred to in the Bible, such as those connected with early rising, sun worship, notifying the first appearance of the new moon, dogs as scavengers, hand mills, lamps, skin bottles, etc., are to be observed in India at the present time.

It was an ancient idea that as the sun rises there, the East was considered to be the front, hence in Hebrew "*the right hand*," "*yemen*" was also *the south* (1 Sam. xxiii, 19, etc.). The Sanscrit name "*Deccan*," *right hand*, or *south* is still employed to denote a certain large part of the Indian peninsula.

Colonel Hendley has lightly touched on the idolatry, bribery, immorality, and degradation of women prevalent in India, which have rendered most of the chief men of that land (broadly speaking) incapable of ruling, though there are, of course, individuals of fine character to be found. These conditions are parallel with the abominations of the heathen Canaanites who were dispossessed of their country for their wickedness by the Israelites (Deut. ix, 4, 5).

Though we English are by no means faultless in India, yet justice, order, and righteous dealing are administered. Let us trust that the parallel to the Israelites in Canaan be not carried further by our adopting any false worship from the inhabitants of India. Hitherto we have been preserved from doing so, but of late years a few Europeans have professed to follow the false light of Buddhism.

Mr. ROUSE.—The fact that the final umpire in the boundary dispute, which was so long in being settled, clothed himself, according to agreement, in the hide of a newly killed buffalo, reminds one that the covenant which the men of wealth in Judea made in King Zedekiah's time to let all their Hebrew bondservants go free was made with the solemnity of cutting a calf in twain and passing between the halves, and when the covenant was broken, God said, through Jeremiah, that He would punish with the sword of the Chaldean army, princes, priests, and people who had "passed between the parts of the calf" (Jer. xxxiv, 8–11, 17, 18, 19). And doubtless this form of covenant had been practised in the family of Abraham and nation of Israel ever since Jehovah himself, in making a covenant with the patriarch touching his descendants, had

commanded him to divide a number of slaughtered beasts in a similar way, and had then caused His fire to pass between them (Genesis xv, 8, 9, 10, 13–17, 18). Symbolically this rite (like the besprinkling of the book, and of the people with blood at the making of the Sinaitic covenant) set forth that all solemn covenants were types of God's great covenant with man, to make which effective, as the epistle to the Hebrews shows us, it was needful that the testator or grantor should first die (Exod. xxiv, 5–8; Heb. ix, 16–20).

The story of Dido's building a city at Carthage upon as much land as a bullock's hide would cover, may be derived from a similar covenant for the grant of the needful land, and not, as is usually alleged, simply from the likeness between the Greek byrsa, a hide, and the Phœnician byrsa, a citadel.

ORDINARY GENERAL MEETING.

WAS HELD IN THE ROOMS OF THE INSTITUTE, ON MONDAY, FEBRUARY 3RD, 1908.

LIEUT.-COLONEL MACKINLAY, IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

ELECTION :—Rev. G. T. Manley, M.A. (Camb.), was elected Associate.

The following paper was then read by the Secretary in the absence of the author :—

ON THE GLACIERS, PAST AND PRESENT, IN THE SOUTH ISLAND OF NEW ZEALAND, TOGETHER WITH THE GREAT VERTICAL MOVEMENTS OF THE GROUND. By C. DILLWORTH FOX, Esq. (Associate Member).

THE South Island of New Zealand presents to even the uninstructed eye, the eye of the merely casual observer, many interesting problems; one of the most interesting being that, in a climate quite as warm as the extreme South of England, there is a glacier system superior to any of the others in temperate climes; that though the mountains are much lower than those in Central Europe (Mount Cook, the highest peak of the range being 12,345 feet high), the ice-work required to ascend them is much greater than in Switzerland, even though the sea, with its warmth and equable temperature, almost washes the foot of the range on the west.

To those specially interested in glacial action, there are many points worthy of observation, for here can be studied, as nowhere else in temperate climates, such great ice-filled valleys nearly level, receiving on both sides secondary glaciers equal in

size to the largest Swiss. According to Von Lendenfeld, the Tasman Glacier has a fall of less than 1,400 mètres in 20 miles of actual length, and the lower portion from the foot of Mount De la Bèche 650 mètres in 12 miles. Here, too, can be observed the effects of prehistoric glaciation, which was on a vast scale, and is apparently more modern, or, at any rate, more strongly marked and more easily distinguishable than the European.

Now, to our tourist, the road to Mount Cook has many points of interest. When he arrives at Lyttelton, the port of Christchurch, he finds himself in the crater of a gigantic extinct volcano, through the side of which a tunnel has been made—a notable undertaking in the early days of the Colony. On emerging he sees before him a vast alluvial plain, the great Canterbury Plains, celebrated nowadays for mutton and lamb (frozen). Arrived at Timaru, a pretty seaport in the downs at the southern extremity of the plains, he turns inland, and after following a river and its gorge for 30 miles, goes over a low saddle into a valley that has been "closed" by the elevation of the land on the east—a phenomenon quite common on this side of the island—and arrives at Fairlie, the terminus of the railway westwards. From Fairlie you coach or motor the remaining 95 miles, first following the river in its windings through the folds of the hills, and go over Burke's Pass into the Mackenzie Country, a plain of considerable extent, from 1,000 to 2,000 feet above sea level, surrounded entirely by the ranges which form the watershed of the great Waitaki River, very barren, and covered with water-worn shingle. In this plain the three great lakes—Tekapo, Pukaki and Ohau—are situated all of which present the same features in that they are all of great depth, and are blocked by a vast morainic deposit consisting of great boulders, from the size of a large hay-stack downwards, embedded in a cream-coloured clay which is eagerly licked by all kinds of stock, and through which the rivers from the lakes have cut their way. You get your first glimpse of the big peaks when nearing Lake Tekapo, but from the foot of Lake Pukaki, 20 miles further on, there is a marvellous panoramic view of the great main range 40 to 60 miles distant. All the way thence to the Hermitage—a comfortable hotel nestling under the southern lateral moraine of the Mueller Glacier, just between Mount Cook and Mount Sefton—the glorious view is unfolding and expanding with every turn of the road. You follow at first the lake, then close under the Ben Ohau Range and Mount Sealey, crossing *en route* innumerable shingle fans,

and getting glimpses of blue ice high up on the left. Right in front towering the tent-like peak of Mount Cook, with Mount Stokes and Mount Tasman on either hand; then Mount Haidinger with its square top, and the three-peaked Mount De la Bèche at the turn of the Tasman Glacier; to the right Malte Brun, with its red rock precipices and great ice fields, and the shingle slips of the Nun's Veil (known locally as Rotten Tommy) complete the view. From the turn of the road westwards, after passing Birch Hill sheep station, you face Mount Sefton, with its great overhanging glaciers, which keep up a thundering of avalanches day and night, and the view from the front door of the "Hermitage" of Mount Sefton reflected in the little lake is a sight never to be forgotten.

Your first trip is naturally to the Mueller Glacier close by, and your first remark is on the shockingly dirty state of the glacier, for no clear ice is to be seen for some miles above its snout, it is so entirely covered with *débris*. At the mouth, however, you see that is on the surface only; that, though such a vast quantity of moraine is carried on its back little or none is to be seen in its heart;—it does not bring along underneath it the "digging tools" one reads about.* This glacier, of all the larger glaciers on the eastern side, would be the one that might be expected to excavate; because it descends at a fairly steep angle, perhaps eighteen to twenty degrees; whereas the Tasman never in its lower portion exceeds five degrees. But the river at the mouth of the Mueller flows out quietly and without any special rush, while, on the other hand, the Tasman River generally bursts up with considerable violence, sometimes to a height of as much as 15 feet, from the pressure of the superincumbent ice. (Not many years ago I can remember when the Mueller Glacier had pushed its ice completely across the valley, and butted right into the spur of Mount Cook, and the Hooker River, which now just washes at the foot of the ice cliffs, flowed right under it.) The Tasman Glacier is also completely covered with *débris* at its lower end, and it is some 3 miles up before you can find a crevasse to sound. The depth confirms what you have surmised, that the bottom of the glacier is much below the level of the river at its source; but this is no evidence of digging, the simple

---

* By "digging tools" the author doubtless means angular blocks and stones which by scoring the bed-rock leave behind grooves and hollows commonly seen where the ice has been moving.—Ed.

explanation being that the matter carried down by the glacier is so enormous as completely to fill up the bottom of the Tasman Valley as the glacier slowly retreats, which can plainly be seen by the successive heaps of terminal moraine all down the valley. The *débris* brought down by the Mueller Glacier is immediately washed away by the Hooker River; there is no room in this valley for its deposition.

In the ice age, or glacial period, of New Zealand, which is placed by Capt. Hutton in the older Pliocene, this glacier with its tributaries, the Hooker and Mueller, combined on the west, and the Murchison and Jollie on the east, was over 40 miles longer than it is at present, and its terminus was at the southern end of Lake Pukaki. All down the sides of the Valley of the Tasman you can see the lateral moraines in several series, the largest and highest being quite 200 feet above the present level of the lake; while the great terminal moraine, though perhaps not quite so high as that at Tekapo, represents a far greater accumulation, for the Pukaki Lake is much the deeper. Now this is exactly the same phenomenon on a larger scale presented by the present terminus of the glacier—a hole blocked with morainic deposit brought forward by the glacier and dropped at the snout. Nor is there here any rock-basin; nothing but the considerable slope of the Mackenzie Plains to the gorge of the Waitaki 14 miles distant, where the three rivers, Tekapo, Pukaki and Ohau, unite. Now I understand that this great hole, the Pukaki Lake, does not show a depth below the level of the rock bottom of the Waitaki; and were it so, though the weight of the ice must have been enormous, and far above computation, still I think it open to question whether ice descending at such a small angle (not more than one degree from the *névé* even were the mountains double their present height) could have possibly dug these great holes, supposing the ice to be armed with the so-called "digging tools," which I maintain are non-existent, or at any rate extremely problematical.

Now Mr. Alexander McKay, F.G.S., Geologist to the New Zealand Government, firmly maintains that, in New Zealand at least, these lake basins are due not to the digging power of ice, but to great earth movements. This South Island is crossed by three great geological faults. In the north-east of the island are the great Kaikouras nearly 10,000 feet high, separated into two ranges by the cleft through which the Clarence River runs. Here one can plainly trace two great faults, one on each side of the mountains, one up the River Awatere, and the other up the

gorge of the Clarence, while a third minor fault goes from the mouth of the Clarence on the south side of the range in the direction of the Hanmer River. These can clearly be followed for many miles, both by surface indications of displacement—miles of tumbled earth in a straight line—which in recent times have marked the "road of the earthquakes," and also by the numerous geological sections to be obtained along the course of the various small rivers draining from the mountains, which show that enormous vertical displacement has taken place. Mr. McKay thinks the whole mass of the Kaikouras was raised to the present height from a moderately elevated plateau since the commencement of Pliocene times; and points out that the general direction of the northernmost of these two faults (they apparently cross at Hanmer Plains where are hot springs, and where the seismic disturbances were at their worst a few years ago) would touch the curious succession of glacial lakes all following one another in a direct line—Sumner, Pearson, Coleridge, Tekapo, Pukaki, Ohau, Hawea, Wanaka, Wakatipu. The country has not as yet been geologically surveyed in detail, except in portions, but traces of the fault have been recognised in many places. Those who have gone overland from Christchurch to Hokitika will doubtless remember the great mass of Mount Torlesse which has been pushed up through the white limestone rocks at Castle Hill. Further south, the fault may be seen crossing the Rangitata at Mesopotamia, and following Forrest Creek to Fox Peak in the Two Thumbs Range. On Simons Hill, south-east of Lake Pukaki, the glacial clay is found 500 feet and more above the plain, as shown by the sheep licks—I mentioned before how fond stock are of this clay, said to contain some form of magnesium—then again at the Ohau, in the elevation of Ben More, and perhaps between Ben Lomond and the Remarkables at Queenstown on Lake Wakatipu.

The third great fault in this island runs nearly north and south from Te Wae Wae Bay in the south west, following the course of the Waiau River, through the length of Lake Te Anau, and down Lake McKerrow to Martin's Bay (Hutton). The whole country to the west of this line is a tangled mass of mountains, so steep and broken as to be very difficult of access, and is densely covered with vegetation, owing doubtless to the excessive rainfall, which averages an inch a day at Puysegur Point. The soundings in Lakes Te Anau and Manapouri show them to be of great depth; while the well-known West Coast Sounds, which have been so graphically described by

Mr. Maclaren in *Vict. Inst. Trans.*, vol. xxxiv, present similar features. This is the oldest geological formation in New Zealand, and is exceptionally rich in minerals. Little, however, has been done to exploit it, except in the case of gold, of which a considerable quantity is now being obtained. There is every reason to believe that all this broken country was once at a much higher elevation (Bell), that the Sounds are simply drowned river valleys, and though they were in the ice-age filled with glaciers, as shown by the smoothings on the rock sides, and by the bar at the mouth of each—due primarily to moraine deposit, not tidal action—it may yet be shown that even in this case the valley is continued out to sea, as is the case in the similar Norwegian fjords. Further north there are several lakes—Lakes McKerow, Mapourika, Kanieri and others—which have terminal moraines and great depth, so that here is a parallelism going far to corroborate the opinions of Mr. McKay, the late Captain Hutton, F.G.S., and Mr. J. McBell of the Department Mines, N.Z., that this closure of the sunken river valleys is mainly due to the deposition of morainic *débris*.

In conclusion, I only venture to suggest that other causes than the excavating power of glaciers may account for the great depths in lakes and fjords, as it is well known that there have been great earth movements in time past. Neither the Kaikouras nor the Spencer Mountains in the north, both ranges close on 10,000 feet, show any sign of glacial action (Hutton)—evidence that they have been uplifted since the glacial period—and since that time there has been a period of great subsidence and denudation followed by a general uplift, which apparently still continues, at least on the east coast; I could instance many closed valleys caused by the rising of the coast line. At Amuri Bluff, 100 miles north of Christchurch, there is a terrace with modern sea shells 500 feet above high water mark (McKay); at Motunau, 50 miles north, a raised beach with similar shells 150 feet above the sea (Hutton). A deposit of silt occurs on Banks' Peninsula to a height of 800 feet (Hutton); and there is every reason to believe that Captain Cook sailed inside Banks' Peninsula, *i.e.*, over the present site of Christchurch; and, either from the deposition of shingle and other matter brought down by the great rivers—as some maintain—or from the gradual uplifting of the eastern side of the Island, there is no doubt that within the period of my observation (the last thirty-five years), the high water mark on the Canterbury coast has markedly receded.

On the motion of the SECRETARY, the thanks of the Society were accorded to the author for his interesting communication, and also to the High Commissioner for New Zealand for the loan of the lantern slides by which the paper was illustrated. The evidences adduced of enormous vertical movements of the land in recent times were of a most striking character, especially those of the Kaikouras and Spencer Mountains.

NOTE ON MR. C. DILLWORTH FOX'S PAPER, BY REV. A. IRVING, D.SC.

In a paper full of original observations Mr. Fox has made a useful contribution to the science of Glaciation as a subordinate branch of the larger science of Geology. He notes the downward extension of the glaciers of South Island as something abnormal. May not the explanation be found in the proximity of the feeding-ground of the high altitudes (the regions of snowfield and *névé*) to the ocean, and the extraordinary amount of precipitation over that area as indicated by the excessive rainfall noted by him (p. 108) at Puysegur Point, averaging an inch per day? This, with the more rapid downward movement of the New Zealand glaciers (owing probably to their "dirtiness" as noted long ago by Dr. Hector) accounts for what appears at first sight an anomaly. The causes being differently proportioned in Nature, the *quantitative results* differ from those with which we are acquainted in the Alps and other European glaciated regions.

The most interesting point of Mr. Fox's observations is the extent to which they tend inferentially to negative the idea that glaciers have a digging or excavating power. Many geologists have fallen into this error owing to their incomplete conception of the *differential movement of glaciers*. (See A. Irving, on "The Mechanics of Glaciers," *Quart. Jour. Geol. Society*, February, 1883; with a supplementary paper on "Solar Radiation and Glacier Motion," by the same, in *Nature*, vol. xxvii, April 12th, 1883; and a criticism of Nansen, *Ibid.*, vol. xliii, p. 541.)

Mr. Fox's observations on the damming-up of valleys by glacial and other detritus also go to confirm what I have observed and written in former years (see A. Irving, on "The Origin of Valley-Lakes," *Quart. Jour. Geol. Society, loc. supra cit.*, supplemented by a summary of Heim's monograph on "Bergstürze," *Geol. Mag.*, March, 1883). Two marked instances of this, from my own Alpine observations, may here be cited: (i) that of the Rosegg in the Engadine, where the retreating glacier at the head of the Rosegg Thal has left exposed the gravel-strewn bed of the quondam intra-morainic lake, as the overflow of that lake has sawn its way down, so as to cut a gorge of 300 to 400 feet deep through the terminal moraine, since Quaternary times; (ii) the case of the Achensee in the Tyrol, where the present lake occupies a faulted valley to a depth of over 2,000 feet, the drainage having been reversed during the Quaternary Period, by the damming-up with glacial detritus of the ancient valley at Maurach, cutting off the waters from the Gorge of Jenbach and the Imthal, and diverting their flow to the north by the Achenthal into the Isar. Such damming-up on a grand scale was described years ago by Professor J. W. Spencer, as the origin of the Niagara overflow from Lake Erie, and was known to the German geologists as the true cause of the overflow of the Bodensee at the Falls of Schaffhausen.

In the face of such evidence and of further facts and reasonings contained in my paper, "On the Work of Glaciers," which appeared in *Natural Science* some sixteen years ago, one may be justified in accepting Mr. Fox's conclusions as sound to Science, and in demurring to the proposition, that the late Sir Andrew Ramsay's theory "has not been seriously undermined," as has been recently asserted in a paper entitled "Ice or Water?" read before the Victoria Institute last year.

A RECENT VISIT TO PETRA: A Lecture. By Mr. ARTHUR W. SUTTON, F.L.S. Delivered at a Meeting of the Institute on February 3rd, 1908. (Short account by the SECRETARY.)

THE city of Petra, capital of Edom and emporium of commerce in early times for caravans traversing the Arabian desert to and from the Persian Gulf to the Tyrian cities, has lain in desolation and ruin since the eruption of the Arabs under Mahomet; but nevertheless, in its solitude it excites the admiration of the traveller for the marvellous beauty of its temples and tombs sculptured out of the native sandstone rock, geologically known as "the Nubian sandstone," rich in colours of red, purple and their varieties. It has generally been approached by western travellers either from Egypt by the Sinaitic mountains and the Arabah Valley, or from Jerusalem by way of the Dead Sea. Both ways are full of difficulty and some danger from the predatory Arabs which requires tact, and the expenditure of liberal *bachsish*. But the party of Mr. Sutton entered the city from the eastern side by way of the remarkable gorge known as the Sik—a torrent bed or cleft in the rock, a mile and a half in length from where it descends from the table-land of Edom to the point where it opens out on the wide expanse of the city; and where, from the obscurity of the lofty walls shutting out the sun, at a sudden bend is revealed the façade of the most beautiful of the temples called "the Temple of Ghuzneh," glistening in the sunshine, and displaying in its portico of Corinthian columns, and entablature richly sculptured, a marvellous example of architectural skill which strikes the beholder with wonder. But this is only the first of a succession of splendid façades by which the whole of this vast amphitheatre has been adorned by its Nabathæan inhabitants.

This is not the proper place to attempt a description of Petra, which has already been done by numerous travellers; and was admirably illustrated by the coloured photographs taken by Mr. Sutton, and thrown on the screen by the lantern, accompanied by his personal description of them. When the expeditionary party, of which the writer was a member, visited the city in 1883, we entered it from the Arabah Valley on the west,* crossing the plain at the foot of Mount Hor, which rises grandly in a cliff facing the western region of the Arabah and

* An account of this visit is given in *Mount Seir, Sinai and Western Palestine*, published by the Palestine Exploration Society, p. 85 (1885).

the Badiet-el-Tih; the scene of the Israelitish encampment during the Forty Years. It was on breaking up their encampment that they desired to ascend on to the Edomite table-land, and asked permission of the King of Edom to pass by "the King's Highway," but were refused (Numbers xx, 16–21). Mr. Sutton supposes (with other writers) that Moses desired to lead the Israelitish host right through the city of Petra up into the table-land beyond. This would have been an impossible task; both owing to the narrow and difficult pathways leading into, and out of the city; and moreover the Israelites in passing through the city would have been exposed to attack from a hostile population. It was through "the border" of Edom, not its centre, that the tribes desired to pass, and this highway was discovered, and in all probability identified by the members of the expedition of 1883–4. The road strikes off from the Wady-el-Arabah towards the mountains at a point a few miles north of Mount Hor. It was partly explored by our party, and the rocks on either side were covered by rude drawings of animals; there can be little doubt, the writer believes, that this was the King's highway by which the Israelites desired to ascend to the table-land of Edom and Moab; and probably Mr. Sutton will admit this view.*

Perhaps this article cannot be better closed than in the words of Dean Burgon's elegy—on witnessing the desolation of Petra which had been foretold by the prophets—and is now plainly revealed to the traveller of the twentieth century:—†

> And this is Petra:—This the lofty boast
> Of Edom's once unconquerable coast!
> These the gay halls through which in days of old
> The tide of life so rapturously rolled;
> These the proud streets where wealth with lavish hand
> Poured the rich spoils of every Orient land;
> All that the seaman's timid bark beguiles
> From Cush and Ophir, Tarshish and the Isles;
> Afric's red gold, Arabia's spicy store
> And pearl and plume from India's farthest shore.
> How changed! how fallen! All her glory fled;
> A widowed city mourns her many dead.
> Like some fond heart which gaunt disease hath left,
> Of all it lived for—all it loved bereft;
> Mute in its anguish; struck with pangs too deep
> For words to utter, or for tears to weep."

* Mr. Sutton has now accepted this view.

† Mr. Sutton has given a detailed account of his visit in the *Friends' Witness*, vol. i, No. 2 (1908).

And of Mount Hor, the tomb of Aaron (Jebel Haroum) Dean Burgon thus speaks; after referring to the rocks and mountains around:—

> "And one there is which beetling o'er the rest,
> Pillows a prophet on its rocky crest;
> Uplifted high, where none but stars may keep
> Their bright-eyed vigils round his saintly steep."
>
> "*Petra*," *a poem by Dean Burgon*, 1845.

ORDINARY GENERAL MEETING.*

ARTHUR W. SUTTON, ESQ., F.L.S., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed, and the following Candidates were elected :—

ASSOCIATES :—Mr. Sim Boon Kwang, Singapore ; Miss Caroline Mary Longdon, Derby. Mr. J. Townsend Trench, Walham Green.

LIBRARY ASSOCIATES :—Birmingham Free Library ; Nottingham Free Library.

The following paper was then read by the author :—

PHILOSOPHY AND "EVOLUTION": AN INQUIRY.

By Professor H. LANGHORNE ORCHARD, M.A., B.Sc.

WHAT is *Philosophy*? What is "*Evolution*"? Is "Evolution" a Philosophy?

Let us compare them, and see whether, in logical language, the two terms "agree" or "disagree."

Definition of Philosophy.—If *Philosophy* be defined as the study of first principles, its function is

1. To investigate the Origins of things.
2. To Explain facts.
3. To Unify knowledge in accordance with our intuitions.

Definitions of "Evolution."—What is "*Evolution*"?† Diverse answers are given. It is a change, say, of form and configuration, as in an army or a fleet. It is development—the growth and passage to maturity and end of the structures and functions belonging to living organisms. Instead of a life-history it may be any other kind of history, *e.g.*, of another "evolution," the "evolution" of an "evolution." We may have

---

* Monday, February 17th, 1908.

† Dr. Walter Kidd has pointed out (*Difficulties of Evolution*) that "it is the nebulous character of the doctrine of Evolution which constitutes its strength."

"the evolution" of an invention, say, of a watch, or of a steam-engine, or of a teleseope (see *Nature*, September 27th, 1906), and (to quote from the *Journal of the Royal Microscopical Society*) we may speak of "the evolution of the fine adjustment of the microseope." In these uses of the term the basic idea appears to be that of progression, *i.e.*, continuous change attended by improvement.*

More serious attempts at a definition tell the bewildered inquirer that Evolution

"is the theory that the condition of things at any moment is the result of the condition of things at the previous moment . . . a series of orderly changes, the condition of things at any moment being the result of the condition at the previous moment" (Wilson).† "We know, of course, that Evolution means the passage from the more general to the more special, and that although as the general result an onward advance has taken place, yet specialization does not always or necessarily mean 'highness' of organization in the sense in which the term is usually employed" (Traquair). Evolution is "the law of the *continuous re-distribution* of matter and motion," or, more formally, "Evolution is a change from indefinite incoherent homogeneity to a definite coherent heterogeneity, through continuous differentiations and integrations" (Spencer). Evolution is an "indefinite and confused movement of the mind of the age" (Wiegand).‡ "A series of orderly changes," a "passage," a "law," a "change," an "indefinite and confused movement."

Modern "Evolution" theories.—Of modern Evolution theories the most influential are the monistic and atheistic doctrine of Haeckel, the practically agnostie doctrine of Spencer, and the theistic doctrine of Le Conte. Differing in many and important features, they agree in a common postulate—the transmutation of species, and *deny* the axiom that like causes produce *like results.*

Why some people accept the "doctrine."—That so unnatural a theory should have been welcomed by many able men, may at first sight seem surprising. In truth it has been taken on *its own profession.* It offers an excuse to some for disbelieving the Genesis record of creation, and hence throws the shadow of doubt

* In *Nature*, August 22nd, 1907, we read of "the evolution of wound treatment during the last forty years."

† *Problems of Religion and Science*, p. 51.

‡ "Darwinismus." Some of the disagreements of evolutionists are interestingly set out in "Vertebrate Morphology." (See *Nature*, April 30th, 1903.)

across the whole Bible. It professes to be a great unifying principle, whereby, apart from Divine revelation, men may solve the "Riddle of the Universe." Thus it appeals to their love of power, and ministers to their pride. Not in infidelity and pride only does the theory find allies. A nebulous *indefiniteness* attracts minds illogical or wearied, especially when this indefiniteness clothes itself with novelty. Some people, trying to conceive of creation and failing in the attempt, have thoughtlessly adopted the evolution hypothesis as an alternative *easy* as compared with the "difficulty" of creation. The philosophical imagination is captivated by a principle claiming identity with the great "law of continuity" illustrated in the development of all living organisms—a principle commended to, not to say enforced upon, younger men, by the advocacy, thorough-going, determined, not always scrupulous, of professors and lecturers occupying positions of active influence.

Few, if any, of the leaders of thought are evolutionists.—Whilst the seven arguments enumerated have singly or collectively exercised on many minds powerful influence toward acceptance of "evolution," it is fair to point out that its motley adherents* include few, if any, of the leaders of thought. Tyndall, though partial to "a fiery cloud," was careful to say that he adopted it as "a provisional hypothesis" only. Huxley, though enamoured of "some form of the doctrine," refused his adhesion to any of the current theories. Among anti-evolutionists we recognize the great names of Sir George Stokes, Lord Kelvin, Lionel Beale, Carruthers, Agassiz, Cuvier, Lyell, Miller, Sedgwick, Owen, Dana, Sir J. William Dawson, etc., etc.

Evolution and Origins.—We shall now investigate (1) whether "Evolution" accounts for the *Origins* of things; (2) whether "Evolution" *Explains* facts; (3) whether "Evolution" *Unifies* knowledge in accordance with our intuitions. We propose to give frequent quotation from Evolutionists.

1. Evolution and Origins.—In many forms of the evolution hypothesis, the aim has been to arrive at *one primary basis*, which by the Brahmins was held to be spirit, and by others to be matter. The British Museum contains a coloured facsimile

---

* Professor Packard (of America) considers that "we have evolutionists divided into Lamarkians, and Darwinians, with a further subdivision of them into Neolamarkians and Neodarwinians, while the latter are often denominated Weismannians. Some prefer to rely on the action of the primary factors of evolution, others believe that Natural Selection embraces all the necessary factors, while still others are persuaded of its inadequacy." (See *Nature*, April 6th, 1899.)

of the Ani Papyrus, a Theban recension of the very ancient Egyptian *Book of the Dead*. In it the god speaks thus of himself and of creation :—

"I am he who evolved himself. I, the evolver of the evolutions, evolved myself, the evolver of all evolutions and developments which came forth out of my mouth . . . " . . . "I developed from the primeval matter which I had made."*

According to Sakyamuni (Gautama Buddh) the basis of the universe is matter, and, in modern times, a similar idea has been advanced by Buchner. De Mallet (in the eighteenth century) claims to have had a revelation that all things came from water. An unknown gentleman named Higgins, described as "the Inventor of Evolution," affirmed (in 1798) his belief that "the filament of organization" is protoplasm. Andrew Lang says

"that Higgins, with unequalled modesty, put forth his epoch-making conjecture in a periodical publication, and in a mere foot-note to a poem." Protoplasm is introduced as "the filament of organization." "This filament, after an infinite series of ages, would begin (why not?) to ramify, and its viviparous offspring would diversify their forms and habits so as to conform themselves to their various incunabula (or environments)." . . . "Upon this view of things," continues Higgins, "it seems highly probable that the first effort of nature terminated in the production of vegetables, and that these, being abandoned to their own energies, by degrees detached themselves from the surface of the earth, and supplied themselves with wings or feet. . . . Others would become men who in time would restrict themselves to the use of their hind feet. Their tails would gradually rub off by sitting in their caves or huts. They would invent language."

A somewhat similar commencement is assigned to man in Mr. A. R. Dewar's recent book, *A Magnetic Theory of the Universe*. Here we are told that

"Man's first progenitors . . . probably appeared on the earth as spontaneously produced protoplasmic cells or ovules, hundreds or thousands in number, developed by sexual and magnetic affinities from a flux of the chemical elements in some ambrosial inlet of water."

Multiple Origin.—The theory just outlined may be regarded as an example of an endeavour, more or less plausible, to trace all things to a *multiple*, generally dual, origin. About 600 B.C.

---

* See *Budge*, p. 99, and note

Anaximander, the Greek philosopher, expounded his theory, which seems an Egyptian in Greek costume. According to Anaximander, the earth was a muddy ocean. The solar heat, acting on this muddy ocean, caused the mud to swell up, by means of the included air, into numerous little bladders. These little bladders acquired horny shells and spines; then somehow they became alive; then they burst their shells and then they came on dry land. After this they grew larger, and went on somehow to develop into higher forms of life, forms which culminated in man.

Chu-Hi's theory.—One of the most complete of these theories is that connected with Chu-Hi. Chu-Hi was a commentator of Confucius, and probably contemporary with Anaximander. Here we have anticipated the modern hypothesis of matter and force. Assuming in his cosmogony the eternity of matter and associated powers, Chu-Hi says

"Under the whole heaven there is no primary matter (*li*) without the immaterial principle (*ki*), and no immaterial principle apart from the primary matter."

He thinks that, strictly speaking, prior existence belongs to the immaterial principle, but that this immaterial principle

"is not a distinct and separate thing. It is just contained in the centre of the primary matter; so that were there no primary matter then this immaterial principle would have no place of attachment."

"Primary matter" consists of the four elements of wood, water, metal, and fire, while the "immaterial principle" (which is, so to speak, its soul) is no other than the four cardinal virtues of benevolence, righteousness, propriety, and wisdom.*

"The primary matter," says Chu-Hi, "can concrete and coagulate, act and do, but the immaterial principle has neither will nor wish, place nor operation; but only where the primary matter is collected and coagulated, then the immaterial principle is in the midst of it. . . The primary matter can ferment and coagulate, collect, and produce things."

To Chu-Hi's system succeeded, some five hundred years after, that of the Latin poet Lucretius, who looked upon nature as resulting from the co-operation of soil, sun, and rain.

In our times we are familiar with Tyndall's fancy that in the remote past everything was latent in a "fiery cloud" of matter

* Williams's *Middle Kingdom*.

and heat. In this, as in other speculations, notably that of Herbert Spencer, is seen the dominant influence of Laplace's nebular hypothesis.*

To explain "The Riddle of the Universe" as to origin and otherwise, Haeckel and H. Spencer have elaborated theories skilful, ingenious, and illogical.

Haeckel's† is *atheistic*, and postulates the eternity of matter and force, which, in his view, is the true meaning of spirit. Matter and force he regards as different aspects or attributes of one and the same thing to which is assigned the name of "substance." "Substance" is supposed to be uncreated and eternal. All things are imagined to have developed, or rather evolved, through the working of force or forces residential in eternal matter, matter being either ponderable (or ordinary) or appreciatively imponderable, this latter termed "ether."

"Every single object in the world which comes within the sphere of our cognizance, all individual forms of existence, are but special transitory forms—accidents or modes—of substance. These modes are material things when we regard them under the attribute of *extension* (or 'occupation of space'), but forces or ideas when we consider them under the attribute of thought (or 'energy')."‡

Living organisms are, by Haeckel, asserted to have originated from *monera*, "protoplasmic compounds" developed out of "inorganic carbonates." He insists that this must have been by spontaneous generation, and entirely agrees with Naegeli's assertion that "to reject abiogenesis is to admit a miracle";§ but a miracle must at all costs be excluded.

"The fundamental idea," he says, "which must necessarily lie at the bottom of all natural theories of development, is that of a gradual development of all (even the most perfect) organisms out of

---

* Moulton has shown that the actual distribution of moment of momentum in the solar system is inconsistent with Laplace's hypothesis—a hypothesis at variance with other physical facts.

† Buchner's system is similar. "Matter," says Buchner, "is the origin of all that exists." "All natural and mental forces are inherent in it (*Matter and Force*, p. 12). There is, however, much more to be said for the idea that philosophy should have as its starting-place the man and human experience. (See *Humanism*, by F. C. S. Schiller, Oxford.)

‡ *The Riddle of the Universe*, p. 77.

§ *Idem*, p. 91. Every form of the Evolution Hypothesis, except the theistic, denies Miracle. Obviously, if Miracle, and therefore Creation, be inadmissible, it is an easy inference that Matter must be eternal. But what sort of reasoner is he who silently assumes as a premise the very thesis which is in dispute!

a single or out of a very few, quite simple and quite imperfect original beings, which came into existence not by supernatural creation but by spontaneous generation or archigony."

Concerning these monera he remarks further that

"... as all trace of organization—all distinction of heterogeneous parts—is still wanting in them, and as all the vital phenomena are performed by one and the same homogeneous and formless matter, we can easily imagine their origin by spontaneous generation."

(Note this word "imagine." It is the key-word of Haeckel's system.)

H. Spencer.—Agreeing with Haeckel that the organic has somehow arisen from the inorganic, and the living somehow from that which had itself no life, and holding with him that the existing universe is the outcome of matter and force, Mr. H. Spencer propounds an evolution system which yet differs in important respects from that of the Jena biologist.

The system of Spencer (although practically agnostic) recognises, behind matter and force, the absolutely certain existence of a great Power—asserted to be unknown and unknowable, a Power of Whose energy, force, as we know it, is but the display and the phenomenon, a Power whose manifestations, vivid or faint, meet us as material objects or as states of consciousness, respectively.

Spencer imagines that, in a dim and distant past, force emanating from the unknown and unknowable Power, Cause, and Reality, began to act upon matter then existing as a homogeneous diffused nebula. Through this action, "successive condensations and concentrations" took place in the nebula, "leading to progressive integrations, and accompanied with corresponding dissipations of motion,"—which process he calls "evolution," though he admits that it were more correctly called "involution."* He attempts to trace out his process successively in the sidereal systems, the earth's geological history, the development and growth of plants and animals, the varieties within species, the physical and social features of communities; also in language, the fine arts, and the various occupations in civilised societies; and draws the general conclusion that

"along with the passage from the incoherent to the coherent, there goes on a passage from the uniform to the multiform." "Such at

* *First Principles.*

least," says he, "is the fact wherever evolution is compound . . . the entire mass is integrating and simultaneously differentiating from other masses, and each member is also integrating and differentiating from other members."*

Le Conte.—In the *theistic* system† of evolution advocated by Le Conte, nature is a manifestation of GOD, is a garment wherewith He has clothed Himself. There are various planes of being, each plane governed by its own characteristic laws. The laws are modes of Divine action working through resident forces, and varying according to the plane of being. According to this able American geologist, beings are continually modifying into different beings, *i.e.*, undergoing evolution, evolution being defined as "a law of continuity," "a universal law of becoming," "continuous progressive change," "a law of derivation of forms from previous forms." Man is "something more than a higher species of animal,"—His spirit is "a spark of Divine energy individuated to the point of self-consciousness and recognition of his relation to God." "Spirit-embryo, developing in the womb of Nature through all geological time, came to birth and independent spirit-life in man." Whence Le Conte concludes that "if God operates on Nature only by regular processes which we call *natural laws*, then He *must* operate on spirit in a different and a more direct way, and this we call *revelation*."

Remarks regarding the ultimate Origin.—Reviewing these various evolution theories as to the Origin of things, our verdict will be that the unity of nature demands that the ultimate origin be not multiple but single. Theories which assume the past eternity‡ of matter are confused, incongruous, inadequate,—confused, for, when analysed, they affirm that, in the last resort, matter and spirit are identical; incongruous with experience and the causation intuition which tells us that matter cannot originate force, and that, since every change is an effect, what is always and perpetually undergoing change must itself have had a cause; inadequate, for the observed facts and phenomena cannot be traced to their supposed original ante-

---

* *First Principles.* In pursuing an interesting argument, Spencer falls not infrequently into the well-known fallacies of *petitio principii* and *ignoratio elenchi.* Spencer quietly assumes that, by proving change and development, he has thereby proved "evolution."

† *Evolution and its Relation to Religious Thought.*

‡ The fact, pointed out by Clerk Maxwell, that the material atom bears the stamp of a *manufactured* article, is alone sufficient to prove that matter is not eternal.

cedent. If the evolutionist thinks to bridge over difficulty by assuming a past eternity for *force* as well as for matter, he may be reminded that force is not an entity, but exists only as the action of spirit. Hence, the supposed dual origin—matter and force—is found to be triple, namely, matter, force, and spirit. Thus, even the hypothesis of evolution must logically recognise *Spirit* as the ultimate Origin of all things; or the "theistic"* is the only evolution theory which supplies any intelligible account of origin.

Emil du Bois-Reymond's Seven World-Problems.—Emil du Bois-Reymond propounded† in 1880, the famous "Seven World-Problems" which, from that time to the present, have received no true solution from evolutionists. These "seven great enigmas" are:—(1) The nature of matter and of force; (2) The origin of motion; (3) The origin of life; (4) The manifest proofs of design in nature; (5) The origin of simple sensation and consciousness; (6) Logical thinking and the origin of language; (7) The freedom of the will. "Believe in God, and all these problems are readily solved. Ignore the Creator, and the demands made on your credulity are numerous and some of them stupendous." The truth of this is illustrated by Haeckel's attempted reply. He would evade the difficulties connected with matter, force, motion, consciousness, and sensation by the easy assumption that they are forms or qualities of a something called "substance," supposed to have had no beginning, but to have existed from all eternity, and that therefore further investigation is superfluous. The origin of life, design in nature, logical thinking and language, are, he says, "decisively answered by our modern theory of evolution." Life is imagined to be explained by "cellular physiology,"‡ cells being supposed endowed with souls. Design in nature is complacently shelved in favour of Darwin's principle of "Natural Selection." Logical thinking and language have resulted, through adaptation and heredity, from "psychic reflex activity," carried on into the further stages of the instincts, intelligence, and definite sounds, of the lower animals.

---

* Even the "theistic" system (though less irrational than the agnostic and the atheistic) is in hopeless conflict with the Divine record in Genesis, and with the testimonies of our intuitions and our experience.

† In the Leibnitz session of the Berlin Academy of Sciences.

‡ Sir Oliver Lodge, however, draws attention to the fact that Life is a something which "can exercise guidance and control" over these cells. (*Life and Matter.*)

With regard to the seventh great enigma—freewill, Haeckel conveniently disposes of all difficulty by asserting* that our belief that we are free is an illusion begotten of our arrogance and presumption. He considers will to be a universal property of living protoplasm, but to be unconscious in the lower animals. Man's inclination is said to be† determined by *heredity*, and the way in which he acts in any given instance is determined, as an "adaptation to the circumstances of the moment," by the "strongest motive." Such are the answers, I will not call them solutions, made by atheistic evolutionists to the Seven World-Problems.

2. *Does evolution explain facts?*—Is evolution more successful in answering the How and the Why than in answering the Whence? Can evolution explain facts? According to the admissions of ardent evolutionists, it cannot explain all.

Evolutionist Admissions.—Some would restrict the empire of the "law" to the inorganic kingdom: others (with Wilson) confess that this limit even is too wide. Speaking of water and its unique and unchangeable properties, Wilson says,‡ "No one imagines that water is an evolved product . . . ." As to *life*, *consciousness*, *sensation*, and man's *intellectual* and *moral* qualities, a large consensus of evolutionist opinion agrees with Russel Wallace that no evolution conjecture is able to explain them. But what sort of philosophy is that which is thus abandoned by its supporters?

Evolutionist Affirmations.—The theory professes to explain body, soul, and spirit; and hold the mirror to their development. It affirms that the organic has come from the inorganic, and then species from other species by (*a*) direct generation, or (*b*) transmutation; the inorganic itself deriving its various forms through the action, long continued, of mechanical force upon what was originally quite simple homogeneous matter, probably in a nebulous condition.

The hypothesis of Simple Homogeneous Matter.—If we inquire as to the How, the explanation is itself nebulous. Although this simple homogeneous matter is *not* met with in nature, except in connection with other matter, or as result of decomposition,§

---

* With H. Spencer.

† *The Riddle of the Universe*, p. 47.

‡ *Problems of Religion and Science*, p. 105.

§ The spectroscope shows that the nebulæ are *not* constituted of simple homogeneous matter. Lockyer's investigations do not go to prove that the stars were formed out of only one kind of matter, but merely that the number of elements is less than had been supposed.

we are not permitted to dismiss the idea as a myth; but are told to believe that it *might* have existed, and that in truth it "must" have existed, for otherwise the hypothesis built upon it would fail. Then a force, operating upon this "homogeneous matter," would, say evolutionists, produce in it varying degrees of condensation and thickness, whence would result the various chemical elements. To the objection that the differences among the elements are other than relative degrees of condensation, *e.g.*, that condensing hydrogen does not turn it into nitrogen, oxygen, chlorine, or any other element, the evolutionist gives no reply except the assertion that the thing did somehow! so "take place" or "arise."

How and *Why* certain portions of inorganic matter should become Organs—eyes, ears, etc., and the one part become an eye, whilst the other part becomes not an eye but an ear, the evolutionist fails to tell us; all he can say is that it "took place," "it arose," probably in some mysterious way, through condensations and thickenings (!)*

We may, however, be permitted to think that this hypothesis of original simple "homogeneous matter," rests upon an unstable foundation. Nature presents to us objects of great diversity—not of degree only but also of kind. On the assumption that they are all fashioned out of one homogeneous material, how did they acquire this diversity?

Diversity of effect implies diversity in the material or in the cause, or in both material and cause. Were one and the same homogeneous matter acted on by one and the same cause, then, even if the amount of action vary on different parts of this material, the differences in effect can be in *degree* only, *not in kind*.

Is Transmutation of Species possible?—The supposed change of Species into new species was inferred from the circumstance that *varieties* can be changed into new varieties, but the hasty generalization is unproved. Vines testifies before the British Association,† that "it cannot be said that the study of Palæobotany has as yet made clear the ancestry and the descent of our existing flora." Huxley candidly tells us that "we know of no animal now living which in any sense is intermediate." Dana, referring to the absence of geological genetic links, does not hesitate to declare that "if the links ever existed, their

---

* We may decline to accept subjective imaginations for objective facts.

† See *Nature*, September 27th, 1900.

annihilation without trace is so extremely improbable that it may be pronounced impossible."* Lamarck's idea that, through its own effort, a creature changed into another of different species, has been exploded by its inherent absurdity. A frog does not *suo motu* turn into an ox, however he may swell himself. The idea that species transmutation may be effected by changing the environment, is refuted by Lyell,† and more recently by Dr. Dallinger's classical experiments on monads; and heredity, reversion, and hybridism, corroborate the testimony of experience. The same refutation applies to the hypothesis that one species came out of another by direct immediate generation—a "grotesque conception" which retains whatever difficulties are connected with "special creation," whilst destitute of the reasonableness which harmonises them.

Attempt to derive Man from the lower animals.—The preceding considerations, negativing all species transmutation, apply to the attempt to derive man from the lower animals. Such attempt is further beset with *peculiar* difficulties, difficulties with regard to his body, with regard to his soul, with regard to his spirit. Of the *first* class are such matters as the explanation (on evolution principles) of the character and order of formation of the teeth, the upright position and the great toe, the brain and association centres, as well as this "highest animal's" young antiquity, and his sudden appearance, difficulties which are recognised, though reluctantly, by evolutionists themselves. Every attempt to prove the assumed descent of man by anatomical reasoning must be held to *have broken down*. As Mivart has pointed out, the method is radically vicious.

Man should be considered as a Whole.—

"We ought" (he says) "utterly to reject the conception that mere anatomy by itself can have any decisive bearing on the question as to man's nature and being as a whole.‡ To solve this

---

* Not only are there *no genetic* links, but Lord Kelvin, Sir Robert Ball, Professor Sollas, and others have shown that the whole *time* which has elapsed since the introduction of terrestrial life, is a small fraction only (say one-hundredth) of that required by evolutionists. (See Edward Fry, in *Monthly Review*, December, 1902.)

† See *Principles of Geology* (Chapter ix of the earlier editions to the ninth). The Rev. J. T. Gulick maintains (*Evolution, Racial and Habitual*, Washington, 1905) that segregation and isolation are essential. "Isolation is an essential factor in the production and maintenance of divergent types." Does this isolation occur in nature?

‡ Professor H. Nicholson says—"The fallacy lying at the root of Evolution is in imagining that resemblance of body, or limb, or embryo, denotes affinity." (*Ancient History of the Earth.*)

question, recourse must be had to other studies, that is to say, to philosophy, and especially to that branch of it which occupies itself with mental phenomena—psychology."

Mental faculties.—How do evolutionists try to account for man's *mental* faculties? They tell us that *consciousness* is a something which somehow* "arose" out of unconscious matter,† "or has been gradually evolved from the 'psychic reflex activity:'" that the notion of *personal identity* is an illusion, as is also that of *free-will*; that human *will* is the resultant of nerve currents flowing together, or that it is produced (in its independent and higher phase) when the "tricellular reflex organ" arises, and a third independent cell—the "psychic" or "ganglionic" cell—is interposed between the sense-cell and the "motor-cell"; and so on. Leslie Stephen‡ gravely informs us that will is determined by character and circumstances, character being itself evolved from antecedent circumstances, and hence it follows that will is really the creature of circumstances.

Is our Knowledge reliable?—Do such explanations really *explain?* It was remarked in the President's Address at the British Association Meeting in 1904, that, on the assumption that our intellectual faculties have been derived from unconscious§ modifications (as evolutionists assert and affirm) of

---

* So Spencer and Haeckel. While refusing to ascribe consciousness to the atom, Haeckel yet attributes to the atom will, sensation, likings, and dislikings! Buchner regards consciousness as only a molecular movement.

† Lotze has well shown the "absolute *incomparability* with one another of physical events and conscious states." We shall agree with D. S. Cairns (*The Contemporary Review*, October, 1904,) that "It is utterly impossible to explain psychic phenomena in terms of their physical conditions." And, with Sir Oliver Lodge, that "Matter is the vehicle of mind, but it is dominated and transcended by it;" and "It is intelligence which directs; it is physical energy which is directed and controlled and produces the result in time and space." (*Life and Matter*, pp. 123, 169.)

‡ *Science of Ethics.*

§ On the attempted derivation of the conscious from the unconscious, Professor E. Armitage remarks—"Order and law are only found without as they are first conceived within the mind, and man remains for ever the measure of the universe that he knows. A science therefore that dethrones man or that presents mind and thought as a late arrival in the world, has plainly missed its way, and is putting the cart before the horse." (See "The Scientists and Common Sense," in *The Contemporary Review*, May, 1905.) Weinster, with reference to attempts to "explain" phenomena of consciousness by physical terms—attraction, molecular vibration, and the like, points out what utter folly it would be thought to "explain" in the same way the inertia of lifeless substances as caused by vibrations of the substance. (See p. 54 of *Die Philosophischen Grundlagen.*)

matter, we have no guarantee as to the validity of their conclusions, and therefore none as to the reality of our knowledge.

Are our greatest certainties illusions?—Nor is it satisfactory to be asked to believe* that things about which our certainty is greatest, *e.g.*, personal identity and free-will, are *illusions because* they are inexplicable on any principle of evolution. Assertion is *not* explanation. To say that human will "arises" as a physiological modification of matter, is a statement tending to produce in the credulous that confusion of thought of which it is an indication.

Evolutionists seek to derive the Moral and Religious from the Unmoral and Unreligious.—Is evolution more successful in "explaining" *moral and religious* faculties? These also are supposed to somehow "arise" out of that which is devoid of them, and without apparent or proved affinity. Moral intuitions, "innate perceptions of right," are said to be results of accumulated experiences of utility by the race, results transmitted by heredity through nervous modifications. According to Stephen,† "we may probably trace the germs of the moral instincts down to the associations of animals."‡ Darwin considers that "the appreciation of justice" is a factor in the "evolution" of conscience. On which it has been well remarked that for such appreciation there must be the *prior* existence of conscience.

Character is supposed to be determined by environment, moral character by social environment—"As every man is born and brought up as a member of this vast organization (the social organism), his character is throughout moulded and determined by its peculiarities, the only difference between morality and custom is in its wider application."§ The great moral basis is held to be the principle of self-preservation, whether of the individual or of society, and "Morality is the fruit of a gradual evolution of the organic instinct continued through many generations; . . . the feeling of moral obligation an abstract sentiment which has developed as abstract ideas in general do." Conduct "is virtuous so far as it is the mani-

---

* Evolutionists, compelled by exigencies of their position, do so inform us.

† *Science of Ethics.*

‡ Stephen should have recognised that the difference to be accounted for is one not of degree but of *kind.*

§ *Idem.*

festation of a virtuous character," which "virtuous character" is an adapted correspondence between a man and his environment, formed not *by* him, but *for* him; "morality is simply the most important qualities of the social tissue,"* and, though "a code of personal conduct cannot be definitely formulated," an individual is to follow "the most persistent instincts," these being supposed to lead him to seek his own welfare, and (so far as coincident with this) that of others; he is "to discern that any given set of instincts corresponds to certain permanent conditions," since "human happiness is the product of a long series of processes of adaptation or adjustment acting either upon the individual or the social organism."

Evolutionist Moral "Philosophy" a failure.—With regard to evolutionist moral "philosophy," it may be remarked that it *confuses* the moral with the unmoral (*e.g.*, justice is a notion supposed† to be a result from the associations of animals, or from those of circumstances). It gives no explanation of the principles of right and wrong, of belief in GOD, of the religious sentiment and moral responsibility; and supplies no adequate practical guidance and incentive for moral and religious progress.

We conclude that evolution does *not explain* man's *bodily* structure, and does not explain his *mental* faculties, and does not explain his *moral and religious* faculties.

One of the leading facts in nature is that of Life. How do evolutionists try to account for *life*? Some (including Spencer and Weismann) *admit* frankly their inability. By others it is imagined to result somehow from physical and chemical forces. Max Verworn, of Jena, asserts that "the life-process consists in the metabolism of proteids"; because these chemical compounds are not present in non-living bodies, but are always present in living organisms. Here he appears to confuse a form of life-activity with life itself. The teaching of evolutionists is that life has resulted from "dead matter"—something entirely devoid of it.‡ This teaching is opposed to all our knowledge on the subject.

Huxley and Lionel Beale.—Huxley affirms that the great doctrine of biogenesis is "victorious all along the line." So

---

* *Idem.*

† *Idem.*

‡ Bastian (in *Nature and Origin of Living Matter*) has the temerity to assert that "Archebiosis" is continually going on now (1906). The wish is too obviously "father to the thought."

much for Haeckel's "archigony." Lionel Beale* publicly puts on record his conviction—a conviction resulting from forty years' study, with the aid of microscopes of enormous power (5,000 linear), of actual Living Matter or Bioplasm—that "Vital Power" is "distinct from all forces, potencies, and properties belonging to or derived from any kind, or resulting from any physical or chemical state, of Cosmic matter." Beale tells us that

"No matter in the *Living State* is subject to physical and chemical laws. The living constituents of living particles are even uninfluenced by gravitation." . . . "I have been unable," he says, "to discover or frame any hypothesis which could be advanced as a reasonable explanation of the facts of any kind of living matter, without admitting the influence of *Infinite Power, Prevision, and Wisdom.* All my efforts to obtain evidence which in reason could be regarded as adequate to account in some other way for the facts, have entirely failed."

Such is the testimony of an "authority" than whom it would be difficult to name one higher, or commanding more general respect. In his Address, before the British Association, on "Stereochemistry and Vitalism," F. R. Japp drew attention to the fact that the results of modern research preclude an explanation of the phenomena of life in terms of the mechanics of atoms.

Life and Enantiomorphs.—He referred, in proof, to the remarkable and entirely *unique* action of living matter in regard to enantiomorphs (opposite hemihedral crystalline forms),—it produces, or selects, one kind of enantiomorphs without the other. Professor Japp showed that

"Living matter is constantly performing a certain geometrical feat which dead matter, unless, indeed, it happens to belong to a particular class of products of the living organism, and to be thus ultimately referable to living matter, is incapable—not even conceivably capable—of performing."

To this unique property of vitalism† may be added that of

---

* See Address on "The Nature of Life," given before the Philosophical Society of Great Britain, 1899.

† Of the optically active substances found in vegetable and animal tissues, Professor Japp remarks that "no fortuitous concourse of atoms, even with all eternity for them to clash and combine in, could compass this feat of the formation of the first optically active organic compound." Sir George Stokes has pointed out that Life is not known to us except as produced by the action of Spirit. Sir Oliver Lodge concurs (see *Life and Matter*).

intransmutability, and that of *directivity*—co-ordinating and arranging bioplastic movements.

We conclude that evolution does *not* explain the fact of *living** *matter*.

Purpose and Design in nature.—Another great fact of nature is the apparent Purpose and Design, the suitability and suiting of means to ends, and of organism to environment and *vice versa*, which is visible everywhere. Except the theistic, no variety of evolution doctrine makes any serious effort to account for this.†

Haeckel's denial.—Haeckel,‡ with characteristic coolness, seeks, not for the first time, to evade difficulty by simply denying its existence.

"Nowhere," according to him, "in the evolution of animals and plants do we find any trace of design. . . . And there is no more trace of 'design,' in the embryology of the individual plant, animal, or man."

Nor is Spencer more illuminating. Take for example, his explanation of the backbone. He tells us that the segmentation is the inherited effect of fractures caused by bending.

Spencer's fallacy.—On which Professor W. K. Brooks (of the John Hopkins University) says that

"Aristotle has shown (*Parts of Animals*, i, 1) that Empedocles and the ancient writers err in teaching that the bendings to which

---

* This is admitted by Spencer, in *Principles of Biology* (vol. i, p. 120), He writes, "We are obliged to recognise that life in its essence cannot be conceived in physico-chemical terms. . . . It needs but to observe how even simple forms of existence are in their ultimate nature incomprehensible, to see that this most complex form of existence is, in a sense, doubly incomprehensible."

† Hume testifies that "The order and arrangement of nature, the curious adjustment of final causes, the plain use and intention of every part and organ, all these bespeak in the clearest language an intelligent cause or Author. The heavens and the earth join in the same testimony." To this testimony of the famous philosophical sceptic may be added the words of that "Prince of Science," Lord Kelvin. Lord Kelvin says, "I feel profoundly convinced that the argument of design has been greatly too much lost sight of in recent zoological speculations. Overpoweringly strong proofs of intelligent and benevolent design lie around us, and if ever perplexities, whether metaphysical or scientific, turn us away from them for a time, they come back upon us with irresistible force, showing us through nature the influence of a free Will, and teaching us that all living things depend on one everlasting Creator and Ruler."

‡ *The Riddle of the Universe*, p. 95. Yet, while denying "design," Haeckel inconsistently admits that there are in nature, "purpose," "contrivance," and "selection."

the backbone has been subjected are the cause of its joints, since the thing to be accounted for is not the presence of the joints, but the fitness of the joints for the needs of their possessor. . . . It is an odd freak of history that we . . . are called upon to re-consider a dogma which was not only repudiated two thousand years ago, but was even then antiquated."

Professor Brooks warns us that the tendency of exclusive laboratory teaching may be to lead us to forget Aristotle's principle; and he points out that the problem of *fitness* is the real problem which confronts the naturalist, and that it is entirely untouched by the explanation of nature as "inherited nature." This "fitness" proves Design, and Design is unthinkable apart from Mind and Will.

Hume's testimony.—

"A purpose, an intention, a design," says Hume, "is visible in everything; and when our comprehension is so far enlarged as to contemplate the first rise of this visible system, we must adopt with the strongest conviction the idea of some intelligent cause or Author.

If we believe that every effect implies a cause, and that cause an adequate cause, and that experience affirms the fact of the universe being modified and changed by the cause called "Will," we shall recognise, as behind and independent of nature, the Mind and Will of the Creator.*

Is evolution the Unifying Principle?—Our conclusion is that evolution (unless of the theistic variety) fails utterly to explain *design* in nature; and that every form of the theory is helpless before familiar *facts*.

3. Lastly, let us enquire whether evolution Unifies knowledge in accordance with our Intuitions.

The supposed unifying principle is found in the dogma that one kind of thing has arisen out of another kind of thing,—the more complex from the less complex, that from the still less complex, and so on, down to one or two simple originals.

The evolution Postulate.—The implicit postulate, regarded as a universal law, is that Similarity among things proves a

* Schopenhauer affirms that "what we are obliged to think as means is in every case the manifestation of the unity of the one Will so thoroughly agreeing with itself, which has assumed multiplicity in space and time for our manner of knowing." (*The World as Will and Idea.*) Wilson points out that "its working is perfect law and order, with absolutely no element of caprice." (*Problems of Religion and Science*, p. 109.) "There is nothing between absolute scientific belief in a Creative Power, and the acceptance of the theory of a fortuitous concourse of atoms." (Lord Kelvin.)

relation of Derivation of one from another (antiquity being measurable by simplicity), or else a Derivation from some mysterious common stem. By "theistic" evolutionists the original or originals are said to be created by GOD; by other evolutionists they are unaccounted for.

Experience negatives.—This *Derivation* hypothesis, undoubtedly essential to evolutionism, is negatived by experience.* Spencer† thought it expedient, in view of irreconcilable facts, to bolster up the "law" of progressive evolution by an opposing "law," the law of dissolution, and to suppose an alternate supremacy.

Spencer takes refuge in a Dual principle.—Hence, the real unifying principle, whatever it may be, is *not* that of evolution.

The evolution principle is besides in discord from our *intuitions*; for it labels as "illusions" the beliefs in a conscious Self and personal Identity and Free-will—things which our intuitions tell us are facts and certainly true. The axioms—"Like (or same), Cause produces like (or same) Effect," "Like (or same) Effect is produced by like (or same) Cause"—axioms with the authority of intuitions, lying at the basis of all experimental knowledge—are denied by evolutionism.

The Causation Axioms.—The affirmation that one and the same animal has produced two such very different creatures as man and the "anthropoid" ape, denies the first axiom; and the affirmation that the particular species of creature called the horse has been produced from two (or more) very different kinds of parentage, denies the second.

Thus, evolution does *not unify* knowledge in accordance with our *intuitions*.

The Inquiry Answered.—We are now in a position to answer the inquiry with which our investigation began. Is "Evolution" a Philosophy? Does "Evolution" (unless theistic) account for *the Origin* of things? Does any theory of "Evolution" *Explain the facts of nature*? Does any theory of "Evolution" *Unify knowledge* in accordance with our *intuitions*? Taking fair note of the statements of evolutionists themselves, we have seen that the answer has, in each case, been *in the negative*. Judged by these three tests of a sound philosophy, "Evolution" must, on a fair review of the evidence, be condemned.

---

* It is also of course, *illogical*. The argument is—all Derived things are (some) Similar things, therefore all Similar things are Derived.

† *First Principles*.

Indefinite and indistinct as the Spencerian nebula, it is in no true sense a *philosophy*. Blinded by devotion to their theory, its advocates have (consciously or unconsciously) magnified resemblances, and ignored or blurred over differences; some advocates reminding one of those "that call evil good, and good evil; that put darkness for light, and light for darkness; that put bitter for sweet, and sweet for bitter" (Isaiah v, 20).

Evolutionist Reasoning.—One is struck, when reading evolutionist reasoning,* by an apparent anxiety to maintain the theory *at all costs* and in disregard of inconvenient facts—the intelligence of the reader among them. A recent writer, admitting that the evidence in favour of a certain hypothesis is by no means as strong as he would desire, complacently seeks to evade the difficulty by saying—

"But the *necessity* of some such *assumption* becomes irresistible when we realize by careful reflection the inadequacy of any other theory to account *for the evolution* . . . †" (My italics).

However "irresistible" this kind of argument may appear to some minds, it is not logical, and is not conducive to the investigation and ascertainment of truth.

Discovery or Imagination?—We may remind ourselves of the wise words of a President of the British Association—

"If we strain our eyes to pierce 'a mystery' with the foregone conclusion that some solution is and must be attainable, we shall only mistake for discoveries the figments of our own imagination."

No method of intellectual procedure is more mischievous than that which, attending merely to resemblances in similar things, systematically slurs over their differences.‡

Discrimination.—The faculty of *discrimination* lies at the basis of all intellectual progress. Locke has remarked that

---

* Dr. Scott (in "The Origin of Seedbearing Plants," see *Nature*, August 20th, 1903) speaking of certain plants, says "their anatomical structure proves them to have had so much in common with true ferns that there can be no doubt of their affinity with them." This is indeed to fall into the fallacy, rebuked by Mivart, that structural resemblance implies genetic affinity.

† How different was Newton's procedure, when his gravitation theory met with a difficulty through an error in the sun's distance as then accepted! That greatest of all scientists hung up his theory until (after two years or thereabout) the error had been rectified, thus giving evidence that he preferred *Truth* to *Theory*.

‡ It has been said of a famous scientist that "his lively imagination was apt to see in the facts what he expected or wished to see."

"to observe every the least difference that is in things, argues a quick and clear sight, and this keeps the understanding steady and right in its way to knowledge"; and "an aptness to jumble things together wherein can be found any likeness is a fault in the understanding . . . which will not fail to mislead it, and by thus lumping of things hinder the mind from distinct and accurate conceptions."

The first of philosophical interests is Truth.—The first of philosophical interests is *Truth*, and (to quote Sir Michael Foster):*

"the seeker after truth must himself be truthful, truthful with the truthfulness of nature. For the truthfulness of nature is not wholly the same as that which man sometimes calls truthfulness. It is far more imperious, far more exacting . . . It is not her way to call the same two things which differ, though the difference may be measured by less than the thousandth of a milligramme, or of a millimetre, or by any other like standard of minuteness. And the man who, carrying the ways of the world into the domain of science," or we may add, of philosophy, "thinks that he may treat nature's differences in any other way than she treats them herself, will find that she resents his conduct."†

That, for some time to come, "Evolution" may receive support from able and influential votaries, and consequently continue to delude minds unaccustomed to the estimation of evidence, the unwary, the ignorant, and the many who, too *indolent* or too *tired* to think for themselves, rely upon the confident assertions of certain "authorities," is possible and probable. History teaches that it is no new thing for unsound theories to be advocated by eminent partisans. Mill‡ has observed that

"a fundamental error is seldom expelled from philosophy by a single victory. It retreats slowly, defends every inch of ground, and often, after it has been driven from the open country, retains a footing in some remote fastness."

The theory of "Evolution" has failed to justify itself to Science. Is it more successful with regard to Philosophy? Being a theory which has for its chief features imaginativeness and hazy pretentiousness, a theory which, failing to substantiate its claim to be either a science or a philosophy, conflicts with the facts of nature and our primary intuitions, it cannot *ultimately* enlist the belief, as it cannot command the convictions, of thoughtful and truth-loving men.

---

* See his Address as President of the British Association, 1899.
† *Nature*, September 14th, 1899.
‡ *Logic*, vol. i, p. 125.

Discussion.

Rev. A. Irving, B.A., D.Sc.—Professor Orchard has done good service to the cause of Truth in the thorough way in which he has handled this question; and, as one who of necessity represents the *theological* as well as the *scientific* aspect of it, I thank him most sincerely for the effective manner in which he has disposed of the so-called "philosophies" of Haeckel and Herbert Spencer, which have a passing fascination for many minds. I do so the more, because he has powerfully endorsed many of my own criticisms of Haeckel and Spencer in a course of sermons written four years ago for the benefit (in the first instance) of the students and staff of our Diocesan Training College. Professor Orchard, however, recognises such a thing as "theistic evolution." On this point I should like to remark that we need not go to America for that: it can be found in my paper on "Evolutionary Law, etc.," of two years ago, by those who will be at the pains to look for it. So I accept Professor Le Conte's enunciation of such a theory, as quoted by Professor Orchard, except that sentence about the "Spirit-embryo," which, I must confess, contains a proposition entirely beyond my mental grasp.

The main contention of the paper is (as I understand it) that *Evolution is not a Philosophy*: it fails to *unify* the whole range of *facts* that come within the ken of the human mind. For more than thirty years I have insisted on that, in the sixth-form class-room of a great public school, in the pulpit, and in various published papers. It fails chiefly at three points:—

(i) As to the origin of matter, its energy, and its properties;
(ii) As to the origin of physical life;
(iii) As to the origination of the higher (spiritual) life of Man—of all that raises him above the Homo of the naturalist.

Now, these are just the points at which the writer of Genesis i invokes special creation. All the rest, it may fairly be maintained, is covered by Evolution in accordance with Law, marked off as

"several phases of Creative thought realised;"* Divine volition expressing itself in *working for ends*, as implied in the repeated formula "God was saying." In this we recognise the *immanence* of creative power, ever directing the variations, which in their totality lead to cumulative results.

I meet, therefore, the thrust of the hinder end of Abner's spear, by a flat denial of the "hopeless conflict" there enunciated; and I do so with the more confidence, when, on turning to a previous page, I observe the crudeness of the author's notions of Chemical Science. He seems to be oblivious of Crookes' "fourth state of matter," of the Periodic Law (as worked out by Mendeléeff) and of the electron theory of atoms, as suggested by Professor J. J. Thomson, of Cambridge, and expounded by Sir Oliver Lodge in his *Romanes Lecture* at Oxford. These have given a new departure, and have opened wide fields for the legitimate extension of the evolution-theory in Chemical Philosophy; so that it is too late in the day to quote the *dictum* of Clerk-Maxwell (though he was not the author of it) that "the material atoms bear all the stamp of a *manufactured* article." No student at all abreast of chemical science in this twentieth century could assent to that; and it "proves," therefore, nothing at all. Has Professor Orchard heard nothing of recent work on the "atom" of copper in Sir William Ramsay's laboratory at University College, or his brilliant work on the resolution of Radium?† So with the "New Geology," Professor Orchard can scarcely be said to be up to date; and he labours under the fallacy, to which Herbert Spencer had to confess in his old age, of using the term "force" as synonymous with "energy."

He might, I think, have recognised Professor George Henslow's insistence on the necessity of *directivity* in a lecture which I heard at University College‡ five years ago, upon which Lord Kelvin based the remarks which he quotes; and he seems to be unacquainted with the writings of Dr. Asa Gray, one of the most profound thinkers on

---

* See *The Guardian*, October 30th, 1907; also the correspondence that followed for some weeks.

† See Professor Ramsay's communication to *Nature*, vol. lxxvii, March 5th, 1908, as indicating the latest phase that this question has assumed (March 11th).

‡ See *Christian Apologetics*. London: John Murray, 1903.

this subject, and one of the foremost scientists of his day in Europe and America.

"Darwinism" (as I contended two years ago) is "not commensurate with the facts," and therefore cannot of itself form the basis of a philosophy; but that is no reason why it should not express a generalisation true for a limited range of facts. But as Asa Gray points out,* "It must be reasonably clear to all who have taken pains to understand the matter, that the true issue is not between Darwinism and direct Creationism, but between design and fortuity; between any intention or intellectual cause and no intention or predicable first cause. It is really narrowed down to this, and on this line all maintainers of an affirmative may present an unbroken front" (p. 89).

Gray quotes Mosley thus: "Intention in Nature having once existed, cannot cease operating; the test and amount of that intention is not the commencement, but the end; not the first low organism, but the climax and consummation of the whole" (*ibid.*, p. 88). Again Gray remarks (*ibid.*, p. 77): "All appears to have come to pass in the course of Nature, and therefore under second causes; but what these are, or how connected and interfused with first cause, we know not now, perhaps shall never know." And once more (*ibid.*, p. 72): "In each variation lies hidden *the mystery of a beginning.* We cannot tell why offspring should be like unto its parent; how, then, should we know why it should sometimes be different?"

With Asa Gray may be mentioned George Romanes; two examples of men who held the theory of Evolution (*with its limitations*), and died Christian believers. In such company a Christian evolutionist may fairly resent being labelled with the vulgar conceit and the blasphemous rant of a Haeckel, or with the crude empiricism of a Spencer, the latter of which has taken in for a time a large portion of the reading public, so as to pass for a "philosophy."

Professor Orchard has done well to enumerate Emil du Bois

---

* See *Natural Science and Religion* (Scribner, New York, 1891); being two lectures delivered to the Theological School of Yale College marked as much by *philosophic thought and insight* as by the knowledge of a "master" in his own science.—A. I.

Raymond's "Seven World Problems" none of which have been solved by Haeckel or Spencer; and I agree with his commentary on them.

I also agree with him that "the first of philosophical interests is Truth"; and the teaching of Sir Michael Foster's address at Dover, to which he refers, was made the basis of a sermon at the time delivered by me in All Saints Church, Brighton, and reported in the *Brighton Herald*. But Foster taught evolution-theory within limits. We shall all agree that "ultimate Truth" is synonymous with "the wisdom of God." That is many-sided; in fact, according to the inspired *dictum* of St. Paul, "many-coloured" (*πολυποίκιλος*): upon which the great divine, Bishop Christopher Wordsworth of Lincoln, remarks, "So is God's wisdom infinite in variety, richness, and beauty, adapting itself to the needs of man in every age, and of every creature in the world." (*Ep. ad Ephes.* iii, v. 10, and *Commentary, loc. cit.*)

Dr. W. Woods Smyth.—The authorities quoted by Professor Orchard as opposed to Evolution belong to the class of those who refused to accept the fact of the circulation of the blood. No physician at the time of the discovery who was over forty years of age accepted the truth of blood circulation. Professor Orchard should have given us the views of some of his authorities at a later date. Lyell and others changed their views. Thirty years after Darwin's *Origin of Species* was published, he could have quoted Wallace, Huxley, Lyell, Vogt, Lübbock, Büchner, Rolle, etc., as accepting Evolution and the Evolution of man. To-day we must adduce in the same category, the Royal Society, the Geological Society, and the Linnean Society.

We may dismiss the views of those who lived before the rise of Modern Science, or who were not influenced by Revelation, as of no value. To-day we are in the position somewhat of those who heard for the first time of Newton's doctrine of Gravitation. Voltaire and the sceptical Encyclopedists hailed Newton's discovery as showing the universe to be in the grip of natural laws and as enabling them to dispense with a Creator. What Newton did in the physical universe, Darwin has done in the realm of Life; and no wonder the same misrepresentations have arisen. Neither Gravitation nor Evolution are to blame. Darwin says:—"There is grandeur in this view of Life with its several powers having been originally breathed

by the Creator into a few forms or into one." The intellectual Fathers of the Church in the days of its early purity and power held the same view. They found it in the Bible. Do not think this strange; sometime ago an Oxford Doctor of Science, writing to the *Standard* in relief of the difficulties of another correspondent, a D.D., said, "Given one who had never read the Bible nor was biased by current views of the Bible, but who was familiar with Biology and Evolution: upon reading the first chapter of Genesis he would be struck with agreement of Genesis with these modern scientific views." Let me say, I never held any other view of the Creation but that of Evolution, and I learned it through the Bible; and have had the privilege of presenting to this Society the fact that the Hebrew verbs teach Evolution pure and simple, as also the Hebrew for *create*.

Dr. W. Woods Smyth, in reply to certain enquiries addressed to him, said: The system of Classification in Natural History is frequently adduced in support of Evolution. The difficulties of the Special Creation view are insurmountable. Would the Creator for no reason place in the animals of to-day, including man, clear evidence of their being descended from earlier and lower forms? Would He give to the human embryo thirteen ribs, as in the case of the apes? In the development of the chick, would He begin by first making an embryo fish with gill slits and their vascular supply and then undo His work and make a bird? Would He *directly* create creatures ready in tooth and claw to tear one another? Evolution requires that such creatures should come to be, but no other view does. I can assure Professor Orchard that my views of the Hebrew word translated *create* are from Dr. Samuel Davidson. We have no higher authority to-day.

Rev. Professor G. Frederick Wright, D.D.—It is interesting to notice that the speaker has had very little to say about Darwin; which leads to the observation that Darwin rarely uses the word Evolution, and, in fact, was not an evolutionist in the sense that Spencer was. Indeed, he said of Spencer, that if he had observed more and written less, he would have conferred a favour upon the world. Darwin's method of investigation was the opposite to that of Spencer. Spencer's method was *a priori* with an unproved and impossible assumption to begin with, from which he attempted to unfold the whole universe. Darwin's method was *a posteriori*. Beginning with the known variations in individuals and in species,

he reasoned backwards to see if there were definite limits to variation. This conclusion that species may have originated by variation from generic types, as varieties have from specific types, was a legitimate process of reasoning from the known to the unknown. But every step back of that leads into increasing mist and darkness and needs to be made with increasing caution.

Philosophically the reasoning of Darwin involves merely the theory of secondary causes, and the extent to which it is possible to conceive them to be endowed with resident forces. Theistic philosophers generally agree that in the process of creation, God has imparted a large extent of inherent power to secondary causes. The seed of the original cabbage had the latent power to develop into a great variety of forms in response to the varying conditions to which it was subjected. The ultimate supposition of Darwin was that the Creator had originally endowed four or five forms of life with the power of developing into existing species in response to the conditions enveloping them. This is not atheistic nor agnostic, and should not be confounded with the theories of Haeckel and Herbert Spencer. The speaker has done excellent service in showing that there were narrower limits to the power of developing by resident forces than even Darwin inferred. Life is more than motion, and cannot have originated from mere motion. The animal has a self-directing power that cannot have come from the vegetable's inherent forces. The spirit of man, with its regard for the moral law, is on a higher plane than that of animals.

Theologians have the same philosophical difficulties to deal with in their theories concerning the origin of individual souls, that biologists have concerning the origin of species. Theologians are divided into two antagonistic camps upon this very point—the Traducianists and the Creationists. The Traducianists hold that the souls as well as the bodies of Adam's descendants are derived from him; while the Creationists hold that each soul is a fresh creation from the hands of God, put into a body which has been propagated from the first through resident forces. It is as difficult, on either theory, to tell when the individual man becomes a living, responsible soul in the image of his Creator, as it is for a Darwinian naturalist to tell when a variety passes into a species.

The doctrine of design is not discredited by Darwinism as it is by the theories of Haeckel and Spencer. The origin of species

through natural selection, simply throws the designer back a step or two, when he is responsible for a broader and deeper system of design, than is involved in the hypothesis of a direct creation of species.

We should be careful not to set too narrow limits to God's power of accomplishing His designs through combination of secondary causes.

Rev. JOHN TUCKWELL, M.R.A.S.—Mr. Chairman,—There are processes of Evolution which none of us question, such as the evolution of the flower from the bud, of the animal from the embryo, and of the solar system from the nebula. But what we do question is the evolution of one species from another. The theory is beset with difficulties, and we want those difficulties removed before we commit ourselves to it. For instance, the theory supposes an ascending series of living beings from the most primitive to man, but no classification has ever yet been propounded that will meet the requirements of the theory. Such classifications as we have are simply those of the most eminent naturalists. But we have no guarantee that these classifications are in the true historic order of created life, and the classifications of to-day will be changed to-morrow. For instance, the Mollusca have sometimes been placed above the Arthropoda; but if you adopt that order, then you place the oyster above the bee or the ant. Can that be right? But if you place the Arthropoda above the Mollusca, then you place the barnacle, which towards the close of its life sinks to the level of a degraded parasite, above the beautiful and complicated air-breathing nautilus. Can that be right? Whatever system of classification you adopt, and whether you classify according to habit or morphological structure, or on any other principle, you cannot avoid these anomalies. Yet we are asked to believe in the theory of an ascension by a ladder which cannot be found or made.

Again, do what you will you cannot make the theory fit with the Geological record. You have, say, some thirty miles of stratigraphical rock in which life appears. The first of these is the Cambrian, having an estimated maximum thickness of 18,000 feet. But there are four divisions of the system, the first of which is some 8,000 feet thick, and in this 8,000 feet you have eight out of ten of the principal forms of animal life—all, indeed, except the Chordata and the Vertebrata, many of these forms swimming together in the same seas and even preying upon one another. Of

course, we shall be told of the possibility of denuded strata which *may* have contained many missing-links, but to establish a theory upon the unknown is not science.

There is another difficulty. So far as we know, no new species are being evolved now. The differentiation of form is quite another thing. Hence there is no opportunity given us of watching this supposed evolutionary process. If evolution is possible, or ever has been possible, it must be due not only to outward conditions but to innate biological tendencies; and we have no proof that such tendencies exist. If in the growth of the same embryo different forms are assumed—the form of a fish and then the form of a bird—there is not the least evidence that there is no vital difference between fish-bioplasm and bird-bioplasm, or that fish-bioplasm can produce a bird. But I think the advocates of the theory have failed to pay sufficient attention to the fact that there is reason to believe that in the earlier ages of the world's history a process was taking place which is not taking place now. If we believe in a Divine Creator with a Will as free as our own, we cannot deny to Him the power of acting paroxysmally as well as gradually, and it is not unscientific to believe that He has done so. Indeed, when we carry our thoughts up into the religious sphere, I suppose none of us will doubt that He has done so in our own experience. If we have become regenerated it was not by a process of evolution that, "we passed out of death into life." Nor will any of us, I hope, be prepared to apply the theory to the Incarnation of our Lord Jesus Christ. As yet the theory is undemonstrated, and we ought not to have it forced upon us upon the authority of great names; and we are only exercising a true scientific caution in requiring that our difficulties should be removed before we receive it.

The AUTHOR'S Reply.—I wish to express my sense of the uniform courtesy and general agreement with which my paper has been received. A special interest attaches to Dr. G. Frederick Wright's remarks upon Vitalism. The inability of evolutionists to account for the fact of Life is of no little significance.

I ought, perhaps, to answer some friendly criticisms, which were not altogether unexpected. Mr. Woods Smyth has already had his contention corrected by Mr. Rouse. Mr. Woods Smyth appears to be misinformed in thinking that the Hebrew in the Creation narrative of Genesis lends support to evolutionism. Some time ago,

in this room, he enunciated the same opinion. Being diffident of my own Hebrew, I consulted a reliable Hebraist, who had no hesitation in declaring that Mr. Woods Smyth was mistaken. The criticisms of Dr. Irving embrace the great and the minute, Asa Gray and the atom. He wishes that my paper had quoted the former, and discussed the latter. Then it would have been still more up to date. I cannot agree with him. Had the subject before the Society been "Science and Evolution," a quotation from Asa Gray would have been appropriate enough, and have deservedly carried weight; but I am not aware that the eminent scientist has any claim to be regarded as an authority in philosophy. And where are quotations to *end*? Is there to be no limit? Most readers will be of opinion that the list given in the paper is sufficiently long, and that, when they are brought up to within a few months of this present day, the paper is well up to date. As to the constitution of the atom, there was not time to discuss it; nor would the discussion have been very relevant, if there had been time. Dr. Irving can hardly be ignorant that scientists are by no means unanimous on this matter. Personally, I hold with Clerk-Maxwell; but even if matter were electricity, this would not affect my argument. I am thoroughly in agreement with Dr. Irving that "the 'accepted conclusions' of mere critics and scholars (based to a large extent on negative evidence) can have *to the scientific mind nothing of the nature of finality*, and that deductions drawn from them can have no surer value than the nebulous data upon which they too often rest."*

To any one here who may with little consideration have adopted some theory of Evolution, may I commend Bacon's wise counsel—"The Lord St. Alban would say to some philosophers, 'Gentlemen, nature is a labyrinth, in which the very haste you move with, will make you lose your way.'"

---

* Dr. Irving, *Transactions of the Victoria Institute*, vol. xxxix, p. 216.

ORDINARY GENERAL MEETING.*

COLONEL C. E. YATE, C.S.I., C.M.G., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following election was announced :—

LIBRARY ASSOCIATE.—Newcastle-upon-Tyne Public Free Library.

The following paper was then read by the Author, with the assistance of the Chairman :—

ON THE SPREAD OF EXISTING ANIMALS THROUGH EUROPE AND TO THE ISLANDS OF THE ATLANTIC; BASED ON DR. SCHARFF'S RECENT WORK, "EUROPEAN ANIMALS."† By Professor EDWARD HULL, M.A., LL.D., F.R.S., (Secretary).

PART I.—INTRODUCTORY.

THE origin of the fauna and flora of islands at a great distance from continental coasts is one of the most interesting problems connected with natural history which can engage our attention. Such islands, it has been observed, are peopled by forms of life which are either identical with, or similar to, those inhabiting the adjoining main lands either at the present day, or at recent geological periods not more ancient than early Tertiary ; and if we confine our attention for the moment to those forms common to the islands of the North Atlantic, distant from continental shores and separated by deep ocean waters, the question arises by what means, and under what conditions can the occupation of the islands by the animal inhabitants have taken place.

---

* Monday, 2nd March, 1908.

† *European Animals, their Geological History and Geographical Distribution,* by R. F. Scharff, Ph.D., B.Sc. Constable and Co., Ltd. 1907.

Now there are several conceivable means by which this distribution may have been effected; and they may be arranged under the following heads:—

1. By human agency; such as accidental transportation by ships, or direct importation.
2. By the natural agency of winds and currents of the sea.
3. By flotation and swimming; and
4. By land connection at a former period owing to the rise of the sea-bed, by which a land passage was afforded for immigration.

1. On the first of these means there is no necessity to dwell. We all know that animals and plants have from time to time been imported into distant lands by man; as for example the rabbit into Australia, and the sparrow into the United States of America; both turning out to be pests in the countries which have become their homes.

2. On the subject of the natural agency of winds and currents which we may term "meteorological agency," the treatise of Dr. Wallace, one of the founders of zoogeography, takes the first place amongst recent writers,* followed by the work of Dr. Scharff, which has given rise to the present essay, in which I shall have occasion to draw attention to the divergence of views of these writers.

3. The third means of distribution need not detain us, as it is of rare occurrence for distant islands; but the fourth is that which will require our attention as one of great importance.

4. *Range of the Subject.*—The able paper read before the Institute last session by Prof. Logan Lobley† may be considered as introductory to the present subject, in that it dealt with the origin of the European fauna. On this occasion we have to consider the problem, how to account for the existence of some of these forms in the far distant islands of the Atlantic; and to investigate the very divergent views of Wallace and Scharff on this problem. And we shall also endeavour to ascertain how the fact of the great uprise of the lands and bed of the adjoining ocean which has been demonstrated by the formation of the submerged continental platform and the drowned river-valleys, throws light on the presence of these island forms of life.‡

---

* *Island Life*, by Dr. A. R. Wallace, 2nd Edit., 1892.

† *Trans. Vict. Inst.*, vol. xxxix, p. 102.

‡ "On the subject of the plant distribution amongst the islands of the ocean." Dr. Guppy's able paper has already been laid before the Institute. See *Trans.*, vol. xxxix, p. 167.

Part II.

Community of forms between the West of Ireland and Portugal.—Before entering directly upon the subject of the fauna of the Atlantic islands, I may here be allowed to interpose a matter indirectly bearing upon it which has impressed itself upon my mind during these investigations. It is a good many years since the late Professor Edward Forbes pointed out the remarkable fact that the fauna and flora of the south-west of Ireland were to some extent identical with those of Spain and Portugal; in other words, that some plants and animals of Kerry and Connemara are peculiar to those parts of Ireland, and do not naturally occur in other parts of the British Islands, but are to be found in the Lusitanian Peninsula. Forbes maintained that it was only by a former land connection that this community of species could be accounted for, and consequently that there must have been, at a very recent period, such a rise in the level of the ocean bed as to form a causeway between the two countries, along which these plants and animals migrated. Amongst the latter are to be found the rare little toad (*Bufo calamita*) known as the "Natterjack," indigenous amongst the mountains of Kerry, and the spotted slug (*Geomalacus maculosus*) which lies concealed under the stones in the same district. But the more characteristic forms are those of the plants such as the *Arbutus*, several species of heath, together with, probably, the *Osmunda regalis*, which grows so luxuriantly by the Lakes of Killarney and western Donegal, also the "filmy fern" (*Trichomanes radicans*), and the "London Pride" (*Saxafraga umbrosa*).

The former land migration of plants and animals appears to have its counterpart in that of the very ancient races of man who settled in Ireland, especially the Milesians, who became settlers in early pagan times. According to Miss Lawless (quoting from authorities, especially *The Annals of the Four Masters**), there were four successive invasions:—1, the

---

* *Ireland*, by the Hon. Emily Lawless, in *The Story of the Nations* Series. According to Miss Eleanor Hull (*Pagan Ireland*, D. Nutt, 1904) there were five pre-Christian invasions, of which the third was that of the Firblogs, the fourth that of the Tuatha-da-Danaan, the fifth that of the Milesians, the ancestors of the present Irish people, supposed to have come from Scythia, by way of Egypt and Spain, and to have landed on the shore of Ireland at Inisfail, or "The Island of Destiny." Miss Hull regards the Formorians not as settlers, but as sea rovers and pirates, like

Formorians; 2, the Firbolgs; 3, the Tuatha-da-Danaan, and lastly, (4) the Milesian. The remarkable coincidence to which I wish to point is this two-fold migration from the Peninsula to Western Ireland, viz., that of man and of plants and animals, and the question suggests itself whether that of the flora and fauna was precedent to that of early man or contemporaneous with it? Measured by the ages of the Egyptian and Babylonian monarchies, the early settlements may have been several thousands of years before our era—a time, sufficiently distant, when the bed of the ocean may not have settled down to its present level from its high elevation during the glacial epoch, and may thus have presented in its shallower parts a land passage for the Milesians from Spain as well as that for the plants and small animals above enumerated. The land connection with Scotland, on the other hand, is indicated by the Irish hare—not the brown hare of England, but the "blue" or mountain hare of the Scottish Highlands, which is common to both countries.

Part III.

Fauna of the Azores, Madeira, and Canaries.—These islands rise from the Atlantic off the coast of Spain, Portugal, and Africa, and are separated from the mainland by wide and deep water. They contain an ancient endemic fauna originally derived from Europe and North Africa belonging to a period which, according to Scharff, may date as far back as early Tertiary,* together with more recent forms of immigrants, such as goats, rabbits, weasels, rats, mice, and bats. There are also numerous birds, including waders, and insects, and the question arises how have these animals been introduced? Was it by a recent land connection, or by those agencies, either natural or human, to which I have referred above? The former view is supported by Scharff, the latter by Wallace; and we will now consider on which side the probabilities and preponderance of evidence lie.

---

the Normans and Danes of a later age. Tradition and invention has had much to do with the history of this age, but there has probably been a basis of reality for the leading events recorded; at any rate the events extended over a very long period.

* According to Wallace, strata belonging to the Upper Miocene epoch are found in one of these islands, pointing to a land or shallow water connection with the mainland at this period.

Let us consider briefly what are Wallace's views as expounded in his important, and largely accepted, work, *Island Life*. He lays down certain propositions which may be accepted by everyone, as, for instance, when he says (p. 71)

"Land mammals cannot pass over very wide oceans."

Again—

"Some animals, as pigs and deer, are very good swimmers, but never voluntarily venture out of sight of land. Small animals, such as squirrels and mice, might be carried on floating trees or 'floating islands,' but it would require a pair of the same species to be prolific—a rare occurrence, and we cannot suppose that such causes have been effective in the dispersal of mammalia as a whole; and whenever we find that a considerable number of the mammals of two countries exhibit distinct marks of relationship we may be sure that an actual land connection, or at all events one within a few miles, has at a former time existed."*

It might be supposed from the above quotations that Wallace believed in the recent connection of the Azores and of Madeira with the mainland, by which the animals I have named above (goats, rabbits, etc.) were introduced; but such is not the case! That these animals have not been introduced by human agency, Scharff has adduced very interesting evidence of an historical kind, derived from the original names given to the islands by their early Genoese discoverers. On Solari's map of the Azores, which dates back to 1385, the names of the islands are indicated as follows:—

Capraria = Goat Island (now St. Michael).
Columbis = Pigeon Island (now Pico).
Li Conigi = Rabbit Island (now Flores).
Corvi marini = Island of sea-crows (Spear-waters ?) now Corvo.

And he adds: "The result of these historical enquiries appears to justify the presumption that mammals, such as the goat and rabbit, are truly indigenous species on the Azores.† This is a view which Wallace does not accept. He considers it improbable that these islands have ever been connected with the mainland, while their wholly volcanic origin is opposed to the view that they formed part of an "Atlantis" including Madeira and the Canaries, though admitting that deposits of

---

* *Island Life*, p. 72.
† *European Animals*, p. 104.

marine origin referable to the Upper Miocene age occur on the small island called Santa Maria.*

These islands are remarkable for the number and variety of birds and insects. According to Wallace, there are 53 species of birds, a large proportion being aquatic and waders—and he considers that many of the birds were carried by icebergs from Europe during the glacial period. Without denying the possibility of so unusual a mode of bird-migration, it may be doubted whether icebergs from the European area were ever carried into Tropical regions of the Atlantic during the glacial period, or that birds could have survived such a voyage—on such a raft.

As regards the insects, Dr. Wallace considers that the butterflies, moths and hymenoptera—which are all of European species—have been introduced in the same manner as the birds! Beetles are numerous, and out of a total of 212 species, 175 are European, and of these 101 appear to have been introduced by human agency. The remainder are indigenous, and of these 23 species have been introduced from Europe directly by human agency†. As for the rest he accounts for their presence by "gales of wind" or "drifting safely for weeks over the ocean," buried in the stems of plants or "in the solid wood of trees in which many of them undergo transformations."‡ After this where can imagination regarding natural agencies stop?

It is with such reasons as these that Wallace endeavours to satisfy his mind regarding the presence of birds, including waders, in the far-off islands of the Atlantic—the reason being that he is a firm believer in the persistency, or permanence, of the deep oceanic floors, and rather than entertain the view that ocean beds have been elevated and lowered in very recent geological times, he falls back on most improbable phenomena in order to account for recognised facts. It was far otherwise with Lyell, who had no such preconceived ideas, who recognising how,

---

* *Island Life*, p. 240. Wallace's statement that there are no terrestrial vertebrata is clearly untenable. Lyell also was under the impression that the only indigenous representatives of the mammalia present in the Atlantic islands were bats, which we know have great powers of flight, for he says, "During this period (Pleistocene or human) no mammalia, not even of small species, excepting bats, have made their appearance, whether in Madeira and Porto Santo, or in the Canarian group." *Antiquity of Man*, p. 497. The names on Solari's map clearly show that the views both of Lyell and Wallace were mistaken.

† *Ibid.*, p. 245.

‡ *Ibid.*, p. 246.

within the Tertiary period, marine formations have been raised high into mountainous land, was quite ready to accept conclusions based on such observations!

No less interesting is the presence of an assemblage of land shells—such as *Helix*, *Pupa*, *Clausilia*, etc.—in Madeira and Porto Santo, both living and fossil—and to some extent local, or proper to each island; only eight of the whole being common. But these genera, shown to be quite indigenous, are those of the adjoining continental regions; and it is inconceivable that they could have been imported into the islands either by human agency, or by those means suggested by Dr. Wallace; thus we are driven back to account for their presence by the hypothesis of an original land connection with Europe or Africa—by which immigration took place.

Dr. R. F. Scharff's views.—We now turn from the above speculations to the more reasonable views of Dr. Scharff, which, as will appear, are in accordance with, and go to confirm the conclusions deducible from recent investigations regarding the features of the bed of the Atlantic ocean. As I have shown in former papers—the rivers descending from the western coasts of Europe and Africa can be traced by means of the soundings on the Admiralty charts—to depths of 1,000 or 1,200 fathoms below the surface—indicating the great uprise of the ocean bed at a very late period.* Such an elevation would produce land connection in the less deep areas existing between the mainland and the far-off islands by which animals may have migrated. Such land emigration is that upon which Scharff founds his views regarding the manner in which the indigenous fauna has established itself far out in the islands of the ocean—and, therefore, corroborates the theory of a former uplift founded on the existence of the submerged river-valleys.

Scharff disagrees entirely with Wallace, when, after discussing the origin of the weasel of the Azores, he says,

"I am, therefore, of opinion, contrary to Dr. Wallace, that the existing mammalian fauna of the Azores supports the view that these islands were formerly connected by land with the mainland."†

It is to be recollected, however, that Scharff recognises an earlier period of land connection than that required for the migration of existing animals, probably in the Miocene period;

* *Trans. Vict. Inst.*, vols. xxx, xxxi, and xxxii.
† *European Animals*, p. 104.

the land connection required in the latter case occurred in the Pliocene and reached its culmination in the Post-Pliocene or Glacial period, and was, as I believe, the immediate cause of the occurrence of glacial conditions in the British Isles and Europe.*

The formation of the river-valleys took place at the close of the Pliocene period, as proved by the late Professor Issel in the case of the submerged river-valleys entering the Mediterranean from Europe; and the subsequent subsidence which approximately brought about the present relations of land and sea took place at the close of the Post-Pliocene stage. Thus we see that physical changes concur with biological conditions in testifying to the great oscillation of level which the bed of the Atlantic and the adjoining lands underwent at the close of the Tertiary period of geological history. To us they seem enormous—amounting, as I have stated, to some thousands of feet—but as compared with the diameter of the earth they are comparatively insignificant, and when we recollect the vast changes of level which can be shown to have taken place in the Alps, the Pyrenees, the Himalayas and other mountainous regions in Tertiary times, they are not unprecedented.

Part IV.

Range of some Special Animal Forms.

I shall now proceed to give some of the more special examples of animal forms common to the islands, including those of Great Britain, and the adjoining lands drawn from Dr. Scharff's work. Some of these are accompanied by artistic illustrations taken from life, or museum specimens, and by a process of shading, the areas of distribution of the animals are represented on a series of the map of Europe very effectively; I will begin with the Auk.

The Great and Little Auk.—In the picture† we have the Great Auk standing with a whimsical air of dignity over his humble and diminutive companion, who is evidently quite content with the relative positions which nature has assigned to them both. Alas! the larger of these birds has disappeared within the present generation, and is only to be found in our museums and collections. It once existed in vast numbers

---

* Hull, "Another probable cause of the Glacial period." *Trans. Vict. Inst.*, vol. xxxi.

† *European Animals*, Fig 11, p. 39.

in the regions bordering the Arctic Circle and Southern Scandinavia, the British Isles, Iceland, Greenland, and the North American Continent. Scharff observes that to judge from the fact that its remains have been found in those refuse heaps called "Kitchen Middens" in the north and west of Scotland and Ireland—it was probably used as an article of food by the early races of man in these islands.

2. Our next illustration is that of the noblest of the deer tribe (the *Cervus giganteus*, or *C. megaceros*), whose giant skeletons adorn our museums, and were so abundant in the old lake deposits of Ireland, and especially in those of Co. Limerick —as to have given to them the name of "the Irish Elk"—a mistaken name, as the animal was not an elk but a deer. Though especially numerous in Ireland, its remains have been found in various parts of the British Isles and Northern and Western Europe. It was, in all probability, a contemporary with man, and was probably exterminated by the wild aboriginal hunters of those regions. Scharff gives a restored figure of this noble animal (Fig. 17) after Keller-Andriæ. The enormous size of the antlers must have prevented him from frequenting the forest, and thus rendering him an easy prey to the wolf and to the arrows and spears of the primeval inhabitants.

3. *The Mole* (*Talpa Europæa*).—I have selected as the next illustration this remarkable little animal, so seldom seen, but whose undermining operations are often visible in the little mounds of earth thrown up on the surface of our meadows, because of the extraordinary extent of its range over the Europasian Continent. It is found throughout England, Wales, and Scotland, but is absent from Ireland, and it extends its range through Europe right across Central Asia to the Chinese Sea. Scharff observes, that like the beaver, the mole must have advanced westward from Asia into Europe apparently within recent geological times—on the ground that, had it advanced from Europe into Asia we should have expected to meet it everywhere throughout Western and Southern Europe since it has had ample time to spread. But I do not consider his reasoning on this point quite conclusive—for it would seem that the Alps, the Caucasus, and the Pyrenees have proved effective barriers to its progress into Italy, Greece and Spain, notwithstanding that it has managed to "creep round" the edges of these mountains, to a small extent. The point, however, is immaterial.

4. *The Roedeer* (*Capreolus caprea*).—This graceful little deer has a wide range in the European area—and extends into the

region east and south of the Black Sea including Asia Minor. It is remarkable that while its companion, the red deer, has survived in the mountains of Killarney (owing probably to careful protection) yet the roedeer is absent from Ireland; but with the red deer it ranges through the Highlands of Scotland, and by itself is found amongst the woods and plantations of the lowlands as far as the Scottish borders. I myself have met with a small herd in the woods south of the Clyde—and there are many districts in England where if introduced the roedeer would find excellent cover. The red and fallow varieties appear to be in greater favour with landowners for stocking the parks of England, than is the roe.

The Hippopotamus.—It need not be said, that this huge amphibious mammal is extinct in Europe, although its remains have been found in England, as far north as Yorkshire. The migration of this unwieldy pachyderm, which is so much bound to a semi-aquatic life along the banks of lakes and rivers, is a problem not easy to solve. Assuming its origin to be in Western Asia, and its geological age to be the Miocene, it becomes clear that the physical conditions of the European area must have been widely different from those of the present day in order that the "hippo" might find waterway over this vast extent of country. But we also know that the conditions were very different in the Miocene age—during which mountains such as the Rigi, were lake basins, and extensive lakes existed in Central Europe, while the Mediterranean area in all probability furnished a chain of freshwater lakes, as was certainly the case at a later period. Once he became an inhabitant of a large lake or river the "hippo" would prove difficult to dislodge—and could maintain an equal contest with savage man owing to his skin-armour and his aquatic habits. Scharff in his map (Fig. 26) indicates the presence of remains of the "hippo" in the border of Portugal north of the Tagus, and in Algeria. His figure of the animal standing with open jaws and formidable teeth, is very effective.

The Reindeer (*Tarandus rangifer*).—Nature has destined this animal to a life midst frost and snow, and it is, therefore, no wonder that its picture gives the impression of a cow with antlers—rather than that of a cousin to the noble stag, or the American Woodland Caribou.* Its present range is restricted

* The Caribou of Canada, consisting of two species which never intermingle though inhabiting part of the year the same regions, is classed by Lydekker with the reindeer, genus *Rangiber*. *Nat. Hist.* vol. ii, p. 373.

to Northern Scandinavia, Russia in Europe, Greenland, with Labrador and Canadian Territory in the New World; yet at one time it spread over the greater part of Europe including the British Isles. Its remains are especially abundant in Ireland, and it lived along the northern foot of the Alps and of the Pyrenees. It seems not improbable that its presence so far south was due to the advancing cold of the Glacial period, and that with the return of warmer conditions it followed northwards the retreating ice and snow of a milder climate. The reindeer is the only member of its tribe which is utilized as of service to man for drawing a sleigh or for similar useful purposes.

The Chamois (*Rupicapra tragus*).—We turn with pleasure from considering the case of the obedient and unhappy reindeer to that of the graceful and lively chamois of the Alps, the Pyrenees and the Caucasus. We are all familiar with this inhabitant of mountains from preserved specimens, pictures, or the admirable imitations in wood-carvings by the Swiss craftsmen. But few ever see a chamois alive amongst its native rocks and precipices. It is the shyest of animals, and long before you can get a sight of it the wary chamois has espied you, and is off at full speed out of sight. It was my good fortune when visiting the mountains of Lucerne in 1904 to get a view with my binocular of a group of chamois standing on the edge of a precipice a thousand feet high and quite out of range of a rifle—if I had happened to be a jager, which I was not. I considered myself lucky to get a sight of the animals even at this distance. The occasion reminded me of another, when, some years previously, while ascending the gorge leading to Petra from the Wady el Arabah, on looking up to the crest of the cliff, I beheld three ibexes standing in a row and gazing down on our party, while a bear was scrambling up to the same position of security, a little distance off, and sending the stones, which gave way under its paws, rattling down the cliff. Ultimately bruin succeeded in reaching the same skyline, and turning round, scrutinised our party, wagging its head from side to side as is the manner of bears. The antics of the bear were not, however, observed by the ibexes, as there was a high rock intervening between them, otherwise the ibexes would doubtless have rapidly increased their distance from the bear, and have given bruin a wide berth. I need scarcely say that I allude to the ibex because it is the representative of the chamois, both in its form, and conditions of life, amongst the mountains of Arabia Petræa. In a word, the ibex is first cousin to the chamois, and he is the "wild goat"

of Scripture in the passage, "the high hills are a refuge for the wild goats and the rocks for the conies"*; these I consider to be the jerboas, which I saw on several occasions in the Sinaitic Peninsula, and once on the summit of Mount Sinai itself.

The Lion (*Felis leo*).—"The king of beasts," as the lion has well been called—though by no means the largest or strongest amongst the carnivora—for it is not so powerful as the tiger†—had a very wide range in Post-Pliocene, and recent times over the Europasian Continent, and invaded Africa, its present home, on the approach of the cold of the Glacial epoch. Its remains have been traced from the north of England through the centre and south into Southern Asia, and its form is engraven on the tablets of ancient Babylon. Of its presence in Palestine in Old Testament times we are aware from frequent references in the Bible, but why it should have been so completely exterminated over this vast area remains an unexplained mystery. On consulting Dr. Scharff regarding this question, he writes: "As regards the disappearance of so many large animals, such as the lion, from Europe, it is no doubt largely due to competition with others that had the same tastes. The tiger, as you remark, may have driven the lion out of India, but as the former is not known to have occurred in Europe, some other cause must have induced the lion to leave us."‡ No doubt, also, increase of population and arms of precision have contributed to the same result. But Africa has offered him a spacious and secure retreat, and with the limits of the chase imposed by the British and Foreign Governments upon hunters, this noble animal, which Landseer has so strikingly modelled in bronze at the base of the Nelson monument, will live to roam at large for an unlimited period of time. I may mention here that the lion does not appear to have reached Ireland or Scotland in its migration from Eastern Europe and Asia, and this fact is regarded by Scharff as evidence of its very late arrival in Britain.

The Mammoth (*Elephas primigenius*).—I shall conclude this part of my subject with a short account of this extinct pachyderm, whose history has justly given rise to so much interesting speculation, and whose remains have been discovered over large areas of the Europasian Continent and North

---

* Psa. civ, v. 18.

† As proved by actual test in the zoological gardens of the Royal Dublin Society by the late Dr. S. Haughton, F.R.S.

‡ Letter dated May 29th, 1907.

America. In this range* is included Ireland as well as England and the region of Central Europe from the coast of France to the Black Sea north of the Alps. That the mammoth was a contemporary with man in Europe we know from the vigorous and life-like, if rude, sculpturings on the walls of cave dwellings of early man and on bone. Its huge recurved tusks naturally attracted the special attention of the primitive hunter and converted him into an artist! And from the marvellous state of preservation in which its remains have been found in the frozen soil of Siberia, and the abundance of the tusks found in the banks of the Arctic rivers, it is inferred that the mammoth inhabited Northern Asia in great numbers at a time when forests must have provided food for his sustenance. The period and cause of his disappearanee in Siberia are involved in mystery. His destruction from the surface of Europe may have been altogether due to the agency of early man. Dr. Scharff thinks that the mammoth may have been the direct ancestor of the Indian elephant, and his woolly covering gave place to that of the present day in India, where the change to a warmer elimate enabled the animal to dispense with his warm clothing. On the question of the spread from Asia of the mammoth, Professor Lobley has given very interesting details in his paper already referred to.† The extraordinary extent to which the mammoth, in company with other large mammals, multiplied in the south-east of England of the present day, may be gathered from the fact stated by Professor Lobley that from one brickfield in Essex the teeth of no fewer than 100 elephants have been extracted, and in the excavation for the railway cutting at Kew Bridge the bones of the following extinct animals have been taken, namely, *Bison priscus*, *Bos longifrons*, *Cervus elaphus*, *C. tarandus*, *Elephas primigenius*, *Felis spelæa*, *Hippopotamus major*, and *Rhinoceros tichorinus*.

In a work of great erudition, entitled *The Mammoth and the Flood* (1887), Sir Henry H. Howorth has discussed the range of the mammoth and the cause of its extinction in the Arctic regions of Europasia. As a disbeliever in a Glacial period, Howorth refers the disappearance of the mammoth to a vast flood or debacle of waters originating in the polar regions, and giving rise to the wide-spread tradition of "The Flood." The name "Mammoth" appears to have been first used by Cornelius

---

* Scharff. *Supra cit.* Fig. 55 and map, p. 173.
† *Trans.*, vol. xxxix.

Witzen of Amsterdam in 1694, who described the remains of the animal under the name of "mammoth," afterwards by Arab change of pronunciation, becoming the behemoth of the Book of Job, in the language of the Old Testament. In my reply to Sir Henry Howorth's work, entitled *Ice or Water*, I hope I have succeeded in proving that the Glacial epoch was a reality, and its occurrence may well have contributed to the disappearance of the mammoth from the northern regions.

Part V.

Iceland.—A very interesting part of Dr. Scharff's book is his account of the fauna and flora of Iceland. He strongly maintains that Iceland was connected by land with Scotland by way of the Faröes, Shetland, and Orkney Islands, and that by this causeway the plants and animals migrated from one region to the other. Our late colleague, the Rev. Dr. Walker, who had a very wide acquaintance with the animals, especially the insects, of Iceland, maintained this view; and when engaged in tracing out the iso-bathic contours of this part of the Atlantic, I was able to determine the southern margin of the causeway with approximate accuracy, having been bordered by the Atlantic on the south and the Arctic Ocean on the north. The animals of Iceland include the reindeer, supposed to have been introduced by man, the Arctic fox, and the field mouse, which is one of the most widely spread mammals of Europe and the British Isles. There are twenty-one different kinds of land and fresh-water molluscs, including *Arianta arbustorum*, which ranges over Central Europe, Scandinavia, the British Isles, and Iceland,* but a former connection with Greenland is indicated by several common species, such as *Succinea Groenlandica*, which is common in both countries, yet is unknown in Europe.†

It is remarkable that while there are no fewer than thirty-three species of moths in Iceland there are no butterflies, which may be due to the long absence of sunshine in a country lying along the Arctic circle. The flora of Iceland, though not abundant, supports the view of the former land connection with Europe and Greenland.

Conclusion.—I hope I have now succeeded in showing from the above short references what a large fund of interesting information concerning the dispersal of the animals of Europe

* Scharff: *Ibid.*, p. 65, Fig. 21. † *Ibid.*, p. 66, Fig. 22.

beyond the limits of the European continent is contained in Dr. Scharff's book. The subject forms a fitting sequel to that of Professor Lobley, who has ably dealt with the biological history of European animals in the paper read before the Institute last session.* Both authors recognise the former changes in the level of the European and adjacent sea-beds owing to which lands now separated by ocean waters were connected, and both recognise the spread of type forms from centres and their differentiation due to geographical changes.

Discussion.

Professor G. F. Wright, D.D., LL.D.—The interesting and most significant facts presented by Dr. Hull in explanation of the dispersion of animals on the islands near the western coast of the Eastern Continent have their analogies on both sides of the Western Continent. North America is bordered on both sides by a continental shelf covered with shallow water, which would become a part of the continent on a moderate elevation. Across this shelf there are drowned cañons leading out to the deep sea opposite all the great river systems, notably, the Hudson and the St. Lawrence. An elevation of a few hundred feet would lay bare the whole of Bering Sea, and join Asia to America, and add greatly to the area over which animals might roam and secure abundant forage.

That there was such a connection at the close of the Tertiary period, extending far into the Glacial Epoch, is clear from the dispersion of the Asiatic mammoth over North America. This huge animal, whose remains are so abundant in Northern Siberia, evidently was enticed eastward by the pasture lands now buried in Bering Sea, and covered by the shallow waters bordering Alaska, Vancouver, Washington and Oregon. In northern Alaska his bones are so numerous and the decay of his flesh so recent that the stench evoked at Escholtz Bay by the warm summer's sun is almost unbearable. Over the northern part of the United States the mammoth ranged as far east as New England, and south to Mexico. He was in

* Lobley: "The spread of the European Fauna," *Trans.*, vol. xxxix.

America during the Glacial Epoch, but he was not destroyed by it. Evidently he survived the fierce struggle for existence brought on in the southern United States by the advance of the ice and its contraction of the inhabitable area. The struggle in which he succumbed was that of the milder climate under which the ice front retreated, when other animals throve better than he; for his remains are found in the peat bogs occupying the kettle holes left on the retreat of the ice. Even the Megalonyx wandered during that mild period as far north as Central Ohio, in latitude 40°.

On both continents the study of the distribution of Tertiary animals sheds a flood of light on the changes of land level that occurred at that time, and shows that they were abnormal, and out of all analogy with those now occurring.

Mr. W. Woods Smyth, L.R.C.S., writes:—I have read Professor Hull's papers with the greatest interest, and am in entire agreement with the views he has presented to us regarding the fauna of the islands of the Atlantic. I think Wallace's theory untenable. The soundings of the "Challenger" Expedition lend some support to Professor Hull's contention, that at a relatively late age land connecting islands and continents lay where now the Atlantic rolls its mighty waters. It is of interest to remember that, until lately, if not till to-day, traditions remain among the Irish on the shores of the Western Ocean of a land visible from Ireland which contained buildings of a pretentious character. I have in my possession a beautiful poem embodying these traditions. It was to them the Land of the Blest. From the same idea of a pre-existing land came the custom of embarking the dying Norse kings to the happy country in the West; while the migration of the lemming under an impulse which drives them on, on, into the ocean, is a profoundly significant testimony to the fact that the Western seas once held a vanished land. I am grateful to Professor Hull for his interesting paper.

Colonel Hendley asked Professor Hull whether any of the fauna of the islands (the Azores, etc.) had been proved to be of American rather than of European character and origin, and whether there was anything in the view that an "Atlantis" accounted for the origin of the fauna of the islands.

In confirmation of the remarks on the mole, he observed that he understood that the animal had been found in India, though it was

extremely rare, and that its presence might possibly be accounted for in the manner suggested for Italy, Greece and Spain. With regard to the lion, it still existed (that is, the maneless variety) in Western India, in the neighbourhood of Simur and parts of Gujarat, but every year it was becoming more rare. He believed that about thirty-five years ago he had seen on Mount Abu the last specimen of what was known locally as the Abu lion. As the Chairman was there about the same time, he might have seen it also, and been responsible for its death!

He stated that he had read in a paper (the *Globe*, of February 28th) that the Russian Academy of Sciences was fitting out an expedition to go to the Yakutsk District to bring back a large mammoth which had recently been discovered, in the intestines of which vegetable remains, hitherto *quite unknown* to botanists, had been found. It seemed possible, therefore, that want of suitable food might help to explain the extinction of the animal. The following is the extract:

"A Siberian Mammoth.

"Discovery of Unknown Vegetable Matter.

"(from our correspondent.)

"St. Petersburg, February 25.

"The Academy of Sciences is fitting out an expedition to go to the Yakutsk District for the purpose of bringing back the huge mammoth that was discovered lately in that desolate region. A remarkable feature of this latest discovery is that vegetable remains, in a perfect state of preservation, and hitherto quite unknown to botanists, have been found in the huge animal's intestines." (See Frontispiece.)*

Dr. Woodward, F.R.S., complimented the author on his contributions to our knowledge of the former extension of continental coasts, on the West of Europe and of Africa, towards the Atlantic, by means of the evidence of Admiralty charts and soundings showing the continuations of the courses of old river-channels now submerged. He referred to the evidence of the elements in the fauna and flora of Ireland which have a Lusitanian

* A photograph of this animal taken *in situ* is given in the *Geological Magazine*, August, 1903, p. 361, together with an account of its transfer to the St. Petersburg Museum by Dr. Herz from the banks of the Beresowka.

origin, showing the ancient extent of the old continental shelf—now submerged—which once united the whole of the British Isles with the Continent of Europe. Dr. Woodward referred to the former vastly-extended range of the fauna of Europe, *e.g.*, the *Hippopotamus*, inhabiting the rivers, lakes, and coasts and islands of the Mediterranean seaboard, and the greater part of England up to Leeds in Yorkshire, and the French, Spanish and Italian areas; the British and Italian forms attaining the size of the largest living hippopotamus; while those found in Malta, Sicily, Crete, Samos, etc., were all *pigmy* forms, like the associated pigmy elephants on those islands. The mammoth *Elephas primigenius* occurred abundantly in the British Isles and on the Dogger Bank and the Eastern English Coasts, proving that the vast adjacent area now covered by the North Sea and the Straits of Dover was then a part of the mainland. Thousands of elephant remains had here been obtained during the past hundred years, but many were destroyed by the fishermen because of the damage done to their nets. The reindeer had an equally wide distribution, and was, like the mammoth, common to this country, France and Spain, over which it migrated to and fro. The Great Auk was certainly exterminated by the hand of man; its remains being found in the "refuse heaps" within the prehistoric times, known as "brocks," in Caithness. There seems no justification for the view that the destruction of the mammoth over *three* continents (Europe, Asia and America) was a contemporaneous event, but rather, like many other mammals, it *gradually became extinct* owing to physical and climatal changes (and possibly *partly to man* himself). The vast accumulations of mammoth remains along the Asiatic coasts is readily explained by drownings; owing to *spring floods* on the great Asiatic rivers, which flowing north, by the earlier melting of the snows and by the heavy spring rains in the south, caused great floods over vast areas near their mouths, which, being close to the Arctic Circle, were still full of ice. Hence the accumulations of elephant remains on the New Siberian Islands and the coasts and rivers of Northern Asia and the shores of Alaska.

"The gigantic Irish deer" (*Cervus giganteus*) was first found in a bog on the Isle of Man, and the specimen was presented by the Earl of Derby to the Edinburgh Museum. Another since obtained has been set up in the Castle at Douglas, Isle of Man. This great deer,

whose bones have been so frequently found at the bottom of peat bogs in Ireland, resting on the shell-marl, lived when these bogs were clear water lakes, often connected with rivers. In crossing the ice in winter they may have fallen through and been drowned (as suggested by Professor Hull), and this may also explain their presence in the Isle of Man. Professor Hull may like to know, that more than one hundred *fallow deer* thus perished in Sir Philip Egerton's park at Tarporley, Cheshire, many years ago. Having out of curiosity crossed the lake to an island in the centre, they stayed too long, and a partial thaw caused the ice to break in places, and the deer falling in, could not extricate themselves, and were drowned beneath the ice in crowds.

Mr. J. Townsend Trench said.—It may interest some of those who have just listened to observations upon the commonly called "great Irish Elk," but more correctly designated the "Megaceros," if I should briefly relate the circumstances under which, some thirty-five years ago, I discovered and secured the complete skeletons, skulls, and antlers of five of these splendid male animals, and the skull and skeleton of one female.

I was travelling from the Limerick Junction towards Dublin, when, having stopped at a station, the guard looked into the carriage where, amongst other things, I had a stuffed eagle. It had snatched a hen from an old woman's fowl yard; she saw it alighting to devour the hen just at the other side of a loose stone wall, which she stealthily approached, and overthrew with her shoulder upon the eagle, which was killed thereby, and which she subsequently brought to me. The railway guard observed, "I know where there is a stranger animal than that." In reply to my enquiries, he said that at a neighbouring cottage a farmer had an enormous pair of deer's horns, which he had found in a bog.

I at once called for a car and drove off to the farmer's house. It was in a poor district, and near the house was an extensive bog. I told the farmer that I heard he had some horns. He said he had, and showed them to me stowed away in his cow-house, and after a short negotiation, I bought them for a few pounds. I then asked him if he thought there were any more near where he had found that one in the bog. He said he thought not, so I said, "Go and get six men with spades to come and dig for two or three hours, and I will give them each half-a-crown, and if we find any more

horns I will give you two pounds for every one we find." In a short time he reappeared with six men with spades, and he guided us to the part of the bog where he had found the antlers already mentioned.

The men went to work, and one of them soon came upon something hard about 5 feet below the surface. On following up this, and removing the peaty matter, we found not only a handsome pair of antlers in good preservation, but also the skull to which they were attached, and also the complete skeleton of the animal to which these had belonged. They were reposing upon a firm white marl bottom, which consisted of very minute fresh-water shells, which must, many centuries ago, have formed the bottom of a fresh-water lake. Encouraged thus, we resumed our excavations, until we had exhumed the remains of six complete animals as above mentioned, all within a space of twenty or thirty yards square.

Not long afterwards I called upon our friend, Professor Hull, then head of the Geological Department in Ireland, and asked him how it happened that the animals were grouped in such a fashion, and how they came to die there, as there were no marks of wounds on any of their bones, and also how came it that the females were so seldom found? He replied that the herd must have been crossing a frozen lake, and that the ice having given way, they were drowned. As to the females, he said that, having no antlers, they escaped notice often, and when found by the country people are usually neglected, being mistaken for horses' skulls. Thus ended a very curious and very interesting experience. I carried off my prizes, and the farmer carried off his money and the diggers theirs.

Rev. Dr. IRVING writes.—I have read with much interest the proof of your paper on "The Fauna of the Atlantic Islands." In favour of your view as to the *epeirogenic* explanation of the spread of that fauna, I am not quite sure that you may not take a wider time-limit than you seem to do, and extend it backwards to include the *Miocene*, which Zittel years ago worked out as a period of elevation of North-Western Europe on palæontological grounds, giving definite expression to his views by his map of the geography of the *Miocänzeit* in his little work *Ant der Urzeit*, which I have quoted in several recent papers.

There is a point previously raised as to the *Osmunda regalis*. That plant is not at all confined to Ireland. At Wellington

College we were quite familiar with it as indigenous to the old Windsor Forest country, and you may find references to it in the writings of Charles Kingsley.

Sir Joseph Hooker, in the *Students' Flora of the British Islands*, gives it a wide range, so as to include Europe (North and South), as well as tropical Africa, parts of Asia, and tropical America.

Mr. MARTIN L. ROUSE, B.L.—The submarine plateau of Western Africa (which our Secretary has studied to so good account) does indeed overlap nearly the whole of the Canary group of islands, about 150 miles being the limit at which it reaches the 2,000 fathom edge of the abyss; but, even if it has outliers reaching to the bases of the Madeira Islands, it can have none extending to the Azores, which are about 700 miles further off. And, after all, it is only the fauna of the Azores whose origin is in dispute; for the Spaniards and Portuguese found the Guanches to have inhabited the Canary Islands from a remote period before their own arrival. Yet because it is inferred from the names given to three of the Azores by their first Genoese discoverers in A.D. 1385, that they were already inhabited by rabbits, pigeons, and goats respectively, it is further inferred that those creatures could not have been carried thither by the hand of man, but must have arrived there at a time when the islands were connected with the mainland.

Now it would be rather strange if the Phœnicians, who under Pharaoh Necho's orders sailed right round Africa, or their Carthaginian kinsfolk, who, under Hanno, sailed as far as Cape Verd, and were wont to trade with the Fortunate Islands, or Canaries, had never reached the Azores; and, accordingly, I have heard the late Doctor Daniel Wilson, the noted anthropologist (in a public lecture wherein he sought to prove that the Carthaginians were the improvers of the civilization of Mexico) cite as evidence the fact that Carthaginian coins had been discovered on the Azores; which is a proof, not of a mere passing call, but either of a shipwreck or of a settlement by Carthaginian mariners—a settlement brought to an end, no doubt, by some unexpected event. Now, even if a settlement was not intended, but the landing was the result of shipwreck, it is not unlikely that goats had been carried by the Carthaginian ship or fleet, and then landed in the island. In the days when condensed milk was unknown, it was a natural thing to carry goats on board ship; they would stand the rough life where cows would

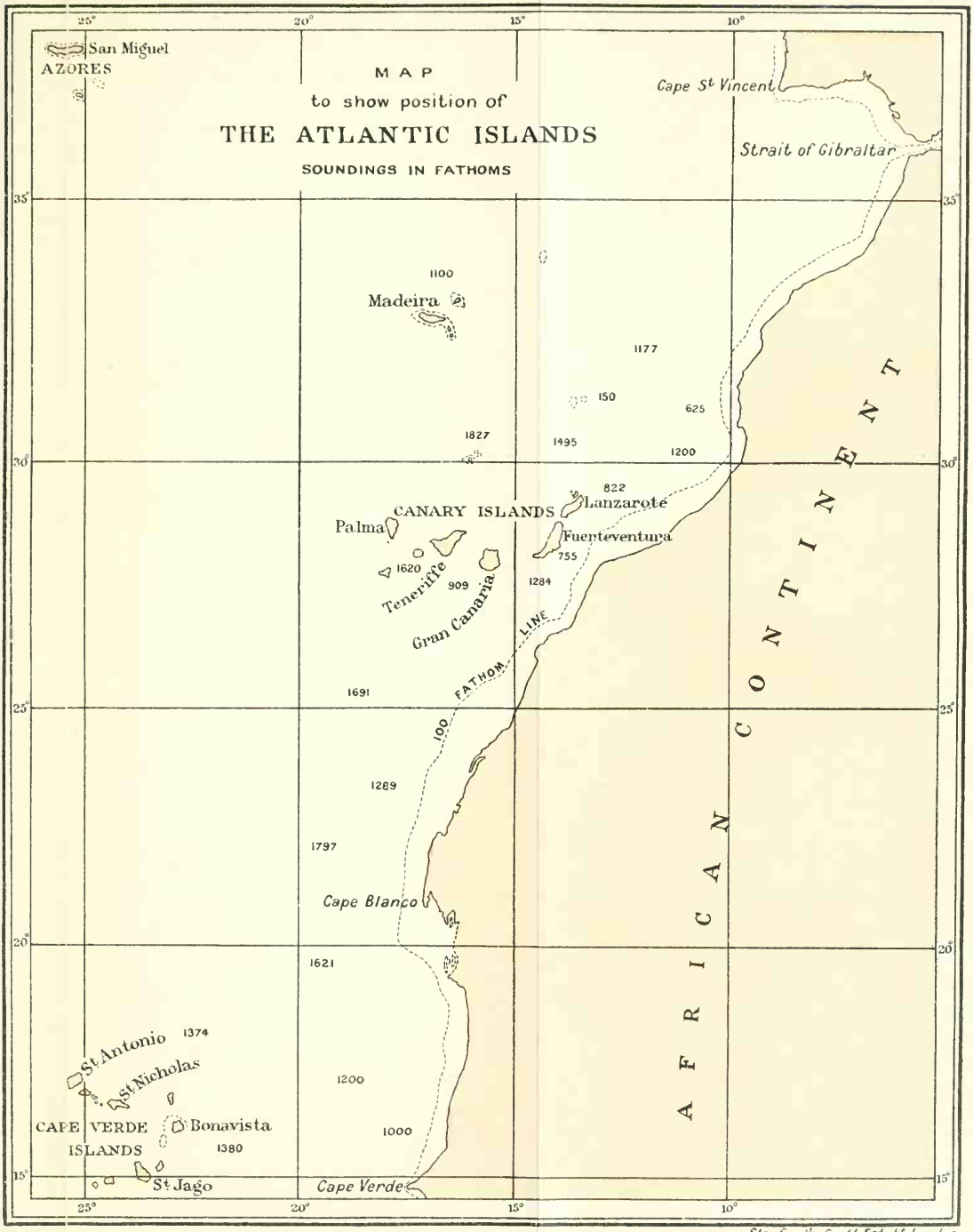
not, and would yield milk to the crew or to the favoured officers. So too, live rabbits and live pigeons might well have been carried as a store of fresh provision; the idea would naturally occur to Carthaginians as it has to Englishmen and Spaniards in later ages. Still, it is conceivable that pigeons, which apparently can fly for several hundred miles at a stretch, may have flown thither in early ages through being blown out of their course, possibly resting on the rigging of passing ships by the way, as even small land birds have often been seen to do.

Professor LOGAN LOBLEY, F.G.S.—This meeting has been highly interesting, both from the paper and the discussion. The opposed views of Dr. Russell Wallace and Dr. Scharff on the origin of the fauna of the Atlantic islands raises the important question of the permanence of ocean basins, which is affirmed by the former and denied by the latter.

An intermediate view, it seems to me, will meet all scientific requirements. The permanence of ocean basins does not require the permanence of ocean areas, and is quite compatible with great extensions seawards of continental areas by elevations of 2,000 or even 2,500 fathoms. Thus the northern Atlantic islands might with such elevations be united with the neighbouring continents, while the deeper parts of the Atlantic Ocean would remain, though restricted somewhat, still a great oceanic area.

REPLY OF THE AUTHOR.

Rising to reply, the author said, that whatever might be thought of the value of the paper, there could be no second opinion regarding the interest of the discussion. He was exceedingly gratified at the manner in which the paper had been received, and especially in having the support of so distinguished a geologist as Dr. Henry Woodward, for the conclusions he (the author) had arrived at regarding the former extension of the land of Western Europe, and of the river valleys traversing the Continental Platform to great depths below the surface of the ocean. The author could not but regret, on patriotic grounds, that the honour of the discovery of the "gigantic Irish deer" had to be transferred from the bogs of county Limerick to those of the Isle of Man; but no doubt the statement



Stanford's Geog! Estabt, London.

ORDINARY GENERAL MEETING.*

THE REV. G. F. WHIDBORNE, M.A., F.R.G.S., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following paper was then read by the Author :

ON THE DECAY OF ULTRAMONTANISM FROM AN HISTORICAL POINT OF VIEW. By Rev. Chancellor J. J. LIAS, M.A.

I HAVE been asked to give an account of the present condition of Ultramontanism from an historic point of view. There can be no doubt whatever that a most extraordinary ferment is at present going on in countries formerly Roman Catholic, and especially in France, which has produced a crop of more recent movements, spasmodic and unrelated to one another, not only in France, but in Spain and Italy, and even in the United States, in South America, and in the Philippine Islands. Many of these movements are wild and unregulated, and not always destined to be permanent. But taken all together, they represent a state of chaos among the members of the Roman Catholic Church which is altogether unprecedented in the history of Christianity. Nor can the keenest foresight, nor the most powerful imagination, attempt to forecast the future of Christianity in these lands. In the sixteenth century, whatever the violence of the religious upheaval, the conflict was at least one between different forms of belief. In the twentieth century it would seem to be a conflict, not so much between different forms of religion, as between belief, non-belief, and downright unbelief. To such a pass has the rule of Rome brought religion in the countries over which she has so long had sway.

---

* Monday, March 16th, 1908.

Not but that there has long been constant dissatisfaction among the more far-sighted and independent of her sons. The names of Wessemburg, Hirscher, Sailer, Schmidt, Rosmini, Gioberti, Curci, Lamennais, Lacordaire, and even Montalembert himself, will remind us that continual protest against the working of the Roman system was raised by men of genius and character in various lands. But all these men agreed in one point. However necessary reform might be, resistance to authority was a thing not to be thought of. So each one of them was silenced in turn, and died in distress and isolation. And as it is a notorious fact that unsuccessful resistance strengthens the hands of those in power, the reforms so ably and conscientiously urged became more and more impossible as each of those who had advocated them was condemned to choose between excommunication and retractation. One, however, of those men, Lamennais, when driven into exile from his Church, uttered a noteworthy prediction. He said that so abject was the spirit of the members of the Church of Rome, that even the noblest of causes could not stimulate their advocates into open resistance to Church authority. If, he added, there ever were such resistance, those who dared to raise the standard of rebellion would be stigmatised at first as fools or madmen; few would join them; and the infant community would be almost overwhelmed with the storm of ridicule and obloquy to which it was exposed. But if its members persevered, he added, they would by degrees attract adherents, but it would be a long time before they would be more than an insignificant sect. This prophesy has been realised to the letter in the history of the Old Catholic body.

That body owed its existence to the Vatican Council of 1870, which put the capstone on the Papal autocracy by decreeing the personal infallibility of the Pope. The summoning of the Council created a great turmoil in Europe. A band of German theologians, with Döllinger at their head, resisted the definitions with all their might, pointing out that they involved a change of doctrine of a very serious nature; that they were opposed to the decrees of the Council of Constance in 1415—decrees which the Council of Trent in the 16th century did not dare to touch; and that they would certainly embroil the Roman Church with the Civil power throughout Europe. I cannot dwell on the history of that Council. Those who wish to study it can do so in the late Mr. W. Arthur's *The Pope, the Kings, and the People.* It is true that the history of the Council, like that of Trent, has come down to us in different shapes. Just as Pallavicino and

Sarpi have told the story of the latter, so Mr. Arthur, following Friedrich and the author of the *Letters of Quirinus*, is confronted by Cardinal Manning, in his *True Story of the Vatican Council.* Modern historians, with their peculiar views of impartiality, have been accustomed to cut the Gordian knot of this conflict of testimony on the well-known commercial principle of "splitting the difference;" that is to say, taking the mean between the two extremes. It would seem to me, I confess, fairer to scrutinise the statements on each side with unsparing severity, just as witnesses on both sides of a case tried in our Courts of Law are examined and cross-examined by the counsel employed, and more especially to make allowance for the fact that the conflicting witnesses are on the one side speaking on behalf of an ancient and powerful association, strong in prescription, in material resources, and in influence with persons in authority, while the witnesses on the other side are men with their lives,* or at least their characters and prospects, in their hands, men who may not unfairly plead that they were urged on by a moral necessity to expose the devices by which their opponents have sought to maintain their influence over the thoughts and actions of mankind.

Certain it was that the resistance to the Vatican decrees was extremely strong in intellect if not in numbers, both within and without the Council, and that the strongest possible pressure of all kinds was put upon the recalcitrants. But the prediction of Lamennais was fulfilled to the letter. Every bishop, except Strossmayer, who had opposed the decrees, ultimately gave in his submission. And Strossmayer, so long as his adversaries let him alone, was indisposed to attack them. The Archbishop of Munich therefore felt himself strong enough to excommunicate the real leader of the opposition, Döllinger, who declared that neither as a Christian, a theologian or a citizen, could he accept the decrees. The excommunication was launched in April, 1871.

The sequel is a further illustration of the soundness of the forecast by Lamennais. The excitement throughout Europe was immense. Would there be any resistance? It had been threatened. And if Döllinger headed a schism, it would most certainly be a formidable one. But Döllinger had enjoyed—or undergone—the training of a Roman ecclesiastic, and at the critical moment he shrank from precipitating a schism. He

---

* Fra Paolo Sarpi was more than once attacked by assassins, and escaped with difficulty from their hands.

resisted as an individual; he submitted as a priest. He subsided into private life and never performed priestly functions again. Without him the resistance became insignificant, as far as numbers were concerned. A few priests and laymen in Switzerland, Germany, and Austria, resolved that they would organize for religious worship, for the baptism of their children, for the religious solemnization of matrimony, and for the burial of their dead. But their numbers did not amount to more than 50,000 in Germany, about the same number in Switzerland, and 20,000 in Austria. In France only one single priest, the celebrated preacher Père Hyacinthe, dared to resist, and one single congregation in Paris alone survives to this day. The French temperament, more vivacious than qualified to maintain an uphill fight, may have been one cause for this. But a far more serious one was that there was war between France and Germany at the time, and that the leaders of the opposition to the Council were German theologians. A few congregations were formed later on in Italy, under the leadership of Count Campello, a former canon of St. Peter's at Rome. But the work was feebly prosecuted and ultimately died out.

The question how the new body was to be provided with a canonical Episcopate, when all the dissentient Bishops eventually submitted to the decrees, except Strossmayer, and when he was disinclined to offer overt resistance, was settled in a singular way. There was in Holland a small and dwindling body which called itself the Old Catholic Church of Holland. This had subsisted for two centuries in consequence of a quarrel with the Pope, which had ended in his launching an excommunication at the recalcitrant Bishops and in their determination to offer organised resistance to what they conceived to be the unjust action of his Holiness. The whole story is full of interest, but it must not detain us now.* It is sufficient to say that the Dutch Old Catholic Bishops threw themselves heartily into the resistance to the Pope's pretensions, and one of them came over to Munich to confirm the children of those who had been excommunicated in consequence of their refusal to accept the new dogma. He was received with enthusiasm, and eventually John Hubert Reinkens was elected by the dissentient clergy and laity first Old Catholic Bishop for Germany. He was consecrated by Dr. Heykamp, Old Catholic Bishop of Deventer at Cologne, on June 4th, 1873, amid general delight.

* It will be found in Von Schulte's *History of the Old Catholic Movement*, and in Miss Scarth's brief sketch of it.

On that very day the Old Catholic Archbishop of Utrecht, who had accepted the invitation to Munich to hold a confirmation, died, and Dr. Heykamp subsequently took his place. Three years later Dr. Eduard Herzog, formerly Professor of Theology at the University of Berne, was consecrated Old Catholic Bishop for Switzerland. In Austria, where there were several congregations, Dr. Cech was elected Bishop, but the Austrian Government refused to allow him to be consecrated, and to this day he remains still Bishop elect, though the recent changes in the Austrian Constitution make it not improbable that the objections to his consecration may be withdrawn.

Everything that money, influence and numbers could do, was done by the Roman Church to crush the infant community. If the Old Catholic leaders are to be trusted—and I for one believe them and have reason for believing them—Roman ecclesiastics stooped to slanders of the vilest kind against men who were giving up all for conscience sake. Protestantism was scarcely less hostile. The German and Swiss Protestants could not understand—cannot yet understand—why these men did not become Protestants. And the German Government—governments on the Continent interfere more in religious matters than we do—was irritated when a *third* religious body came into existence and demanded State recognition. That recognition was not denied, but it was grudgingly accorded, and so the State, the Roman Catholic and the Protestant Churches united to stifle the infant communion in its cradle. As the Lutheran Professor Beyschlag, who up to his death warmly championed the movement, once said, there was no form of persecution, short of death or imprisonment, which had not been employed to break up the Old Catholic Church. And the Roman system which had for centuries been strong enough to bear down all opposition within its pale, had created a timid and helpless laity, a still more timid and helpless priesthood, and a most timid and helpless Episcopate—all of whom were hopelessly ill-adapted for resistance of any kind. Well did Lamennais prophesy that any attempt at organised resistance to the Papacy would be found almost an impossibility. But the "little flock" went bravely on its way and defied all the combined attempts to put it down.

Meanwhile the struggle over the infallibility question excited the keenest interest in this country. In the earlier stages of the struggle the columns of the *Guardian* were full, week by week, of news from Germany, and especially from Munich. But with the submission or inaction of all the Bishops present at the Council the interest of the Tractarian leaders in the conflict

visibly waned, and when Döllinger refused to head the schism it had almost disappeared. But with an inexplicable, yet most pardonable inconsistency, Döllinger became the champion and the counsellor of the Church he had refused to join. He called together members of the Churches which claimed the title of Catholic, and in 1874 and 1875 Conferences were held at Bonn, which were attended by Anglican bishops and priests, Russian ecclesiastics and "Orthodox" bishops. I myself went to the Conference in 1875, at which, among others, Archbishop Plunket and Canon Liddon were present; and the scene was a striking one. It seemed as though the cause of disunion in the Christian Church had been at last arrested, and that the current of feeling would henceforth run in the direction of reunion. The formula of concord between East and West arrived at on that occasion, after long and thorough discussion, seemed a pledge that this pleasing prospect was not deceptive.

But the time for reunion movements had not yet arrived. The baneful spirits of prejudice and mutual suspicion were still too powerful. The refusal of Dr. Pusey to accept the formula cooled Dr. Liddon's interest in the movement. The more extreme of the Tractarian party raised the cry of "schism." The Tractarian journals either threw cold water on Old Catholic concerns, or suppressed as much information about their affairs as possible. They sometimes even hinted that they "could a tale unfold" about the Old Catholic clergy, which, out of kindness they would leave unrevealed. The old-fashioned Anglican or High Church party still held fast to a movement which seemed to approximate to our own English Reformation. I am sorry that I must refer my hearers to Miss Searth's work for the generous and enthusiastic appreciation of the movement and its leaders on the part of Bishops Christopher Wordsworth and Harold Browne in England, and of Bishop Cleveland Coxe in America. But most unfortunately, as I must think, the old-fashioned High Churchman took no steps to preserve their existence as an organised school of thought in our Church, and our moderate men now are moderate by temperament rather than on definite grounds of theology and history. The old warm and generous appreciation of the English Reformation, and of the English Prayer Book as its exponent, has died out, and with it all interest in a movement which, of all religious movements, approaches most nearly to the principles of the Reformed Church of England. As long as Bishops Christopher Wordsworth and Harold Browne lived, there was close and continuous communication between the Old Catholics and our

Church, which culminated in the visits of Bishops Reinkens and Herzog to England in 1881, when they repeatedly received Holy Communion with the bishops and clergy of our Church. Since that time a coolness has been allowed to grow up on both sides, which has slowly and steadily increased. Bishop Herzog had already, in 1880, crossed the Atlantic, and had been received in full Convention by the American Church as a Catholic Bishop. But the same mysterious coldness, the causes of which I am unable to fathom, seems to have crept in between the American Church and the Old Catholics. The latter fancy it is because they are a small and not rapidly growing body (how far this is true we shall see presently). It has doubtless been increased by what is known as the "pact of Utrecht" (what that is I will shortly explain). But I am bound to say, personally, that I can see no rational ground for the coolness which exists, and that I am convinced that it is the duty of lovers of peace on both sides to put an end to it as soon as may be.

The new movement was imperilled at the outset by dangers from within as well as from without. The first intention of those who raised the standard of rebellion was, as "Old Catholics," to take their stand upon the doctrine and practice of the Latin Church previous to the Vatican Council. But at no great distance backward there loomed upon them the dogma of the Immaculate Conception of the Virgin Mary, decreed by the Pope on his own sole authority in 1854. To this decree they were themselves, if not actively, yet at least passively, bound. By degrees they found themselves compelled to disown the decrees of Trent, and finally to cut themselves adrift from all which had not formally been decreed as doctrine previously to the great schism between the East and the West in the eleventh century. With this doctrinal reform, the necessity of reform in the discipline and ritual of the Church was inseparably connected. This new departure, however unavoidable, placed them on an altogether different footing to that which they at first intended to take, and was soon found to have raised up some serious difficulties in their way. It was, nevertheless, impossible to recede from the path of reform, and Transubstantiation, the Roman doctrine of Purgatory and its abuses, that of Invocation of Saints, the belief in Seven Sacraments, in the necessity of Confession, in the application of the Sacrifice of the mass to the soul of any one person, living or dead, were given up, and a commemoration of the souls of the faithful departed was substituted for public prayers for the dead. The Calendar was revised, and its reference to many legendary

saints and events was struck out. The service was cleared, as ours was in the sixteenth century, of what was regarded as superstitious, unhistorical, heterodox, or doubtful, and in Germany and Switzerland, as also in Austria, it was translated into the vernacular, and communion in both kinds was, for the present at least, permitted, though not enjoined. These changes, necessary as they were to the future growth of the Old Catholic body, were vehemently resisted by a section of it, and as an instance of the difficulties involved in such forward steps, it may be mentioned that the Abbé Deramey, who presided over an enthusiastic congregation of 1,500 souls at Porrentruy (or Pruntrut) in the Bernese Jura, positively refused to accept the changes, left his cure, and Porrentruy has been lost to the movement ever since. The movement received a still more serious check in 1878. The laity, in view of the frequent scandals resulting from the rule requiring all clergy to be celibates,* insisted that this rule should be abolished. The Bishops, afraid of the consequences, resisted the proposal. Döllinger energetically pronounced against it. But in Germany the proposition was carried by 19 clergy to 6, by 56 lay delegates to 16. The immediate effect was disastrous. Döllinger protested, and his protest was supported by the learned and excellent Professors Friedrich and Reusch. The former declared that the infant church had at one stroke alienated the vast majority of the devout women throughout all Europe. The Dutch community threatened excommunication, though the threat was never carried into effect. What was worse, the number of congregations in Baden sunk at once from 44 to 36. The number of souls in Prussia sank from 21,650 to 18,351, and this decline was progressive in Baden as well as Prussia until it was arrested in 1883. In Bavaria, where Döllinger's influence was all powerful, no numbers were reported between 1878 and 1883, when they were found to have been diminished by one half.

Yet the brave little band still struggled on. But its history since 1878 has been a hidden one. Switzerland and Austria ranged themselves by the side of Germany on the celibacy question, but apparently without the sinister influence upon numbers which was experienced in Germany. The little Dutch Church, which had been crystallized and unprogressive

* The inquirer may be referred, on this delicate subject, to the reports of convictions given in *La France Noire*, by Paul Desachy, pp. 294, 295, 296, note.

since 1700, refused to alter either doctrine or practice in any way, and the Roman Mass, and even the prayer for the Pope, are still retained in its Liturgy. The first parish formed in the Roman Catholic Cantons in Switzerland was formed at Lucerne in or about 1884, and after a desperate struggle to obtain a Church from Government to worship in, which lasted about ten years, the Old Catholics and the Anglican Church in America combined to build a Church for themselves, where they still worship together. No further steps, however, have been taken in the Catholic Cantons. In 1890 the "pact of Utrecht" to which I have already alluded, was formed, bringing the five Old Catholic Bishops into close and constant connection. This was much lamented by the friends of the movement in this country and America, and was doubtless one reason of the coolness which has sprung up between the Anglican and Old Catholic Churches. The Dutch Old Catholic Church was possessed with a strong prejudice against us Anglicans, which in 1894 displayed itself in an attack on the validity of our Orders, published when some Anglican clergy were their guests at a Congress held at Rotterdam. This attack was at once energetically repudiated by Bishop Reinkens and Professor Friedrich. But the mischief done has never been repaired. It threw many Anglicans who were well disposed to the movement into the arms of those who had energetically protested against it from the beginning. Yet it is impossible to see how the Old Catholics could have done otherwise. It was impossible for either the German or the Swiss Bishop to repudiate the body from which they had obtained their succession. And as separation was thus felt to be impossible, closer union was inevitable, let the consequences be what they might. And after all, the closer union has been found to cut two ways. A visitor to the Congress at the Hague in September, 1907, could not fail to perceive how far the Dutch body had progressed in a liberal direction since 1894. And as a proof thereof it may be stated that a version of the Liturgy in Dutch has been prepared by authority, and may at any moment be formally adopted.

The literary result of the movement has been altogether out of proportion to its numbers. Von Schulte's monumental work on the Old Catholic movement, the great work of Döllinger and Reusch on the Jesuits, Langen's history of the Roman Church, Michaud's learned researches into the history of France in the seventeenth and eighteenth centuries, are known to all scholars. The *Deutscher Merkur*, a newspaper published at Bonn, has been a great help to the struggling communion. The weekly organs

of the movement are able and well conducted. And the establishment in 1892 of the *Revue Internationale de Théologie*, which has appeared quarterly ever since that date, and which has contained articles in German, French, and English by members of the Old Catholic, "Orthodox," and English Churches, has at least maintained the character of the movement for intellect and learning. Nor should the historian of the movement omit to mention the Congresses which have been held biennially or triennially since 1892. The first Congress held at Lucerne was in many ways a notable gathering. I cannot now enter into particulars. But if the succeeding Congresses have been far less remarkable and epoch-making, and if we Englishmen have unfortunately been chiefly conspicuous in our absence from them, they have undoubtedly been among the most effective means of keeping the Old Catholic Churches together, and in being. Their numbers have not grown to any very great extent save in Austria, where the *Los Von Rom* movement, erroneously supposed to have been a purely political movement, has largely augmented, and is still largely augmenting, the numbers both of Protestants and Old Catholics. Under its auspices, Old Catholicism has extended to Bohemia, Styria and the Tyrol. In Germany and Switzerland the Old Catholics have unquestionably at least repaired the losses I have mentioned above, if they have done no more.* But the Hague Congress of 1907 showed signs of expansion in very remarkable and unexpected ways. The unrest and dissatisfaction which permeates the Roman Church from one end of the world to the other, broke out a few years ago between the Polish Catholics and their Irish Bishops at Chicago. The Old Catholics were appealed to, and they consecrated a Bishop for the Poles, who were supposed to number about 40,000. The Bishop died in 1907. His flock at once appealed to the Old Catholics to consecrate another Bishop. Dissensions had broken out among the adherents of the first Bishop. But it was announced at the Hague that both parties had united to elect Franz Hodur in his stead, and he was accordingly consecrated in Holland last October. A considerable number of dissatisfied Czechs in America also sent a Bishop elect to the Congress, but it was decided not to consecrate him at present, but to authorize Bishop Hodur to perform for these dissentients any episcopal acts that might be necessary. The representative of some

* Congregations were formed for the first time at Stuttgart in 1907, and at Lausanne in February, 1908.

Portuguese Reformers also appeared at the Congress, and asked for, and received, expressions of sympathy.

Bishop Van Thiel, of Deventer, announced that applications had been received from France, and that as soon as properly elected candidates to preside over Old Catholic sees there had been presented to the Dutch Bishops, they were prepared to consecrate them. The republic of Bolivia, having disestablished its Church, sent a deputation to Europe not long ago to report on the condition and working of the Old Catholic Churches. It is clear, therefore, that, in spite of the repeated prophesies that Old Catholicism was either dead or dying, it is very far from being either one or the other. On the contrary, it is extremely likely that, in the chaos into which Rome is being reduced all over the world, large numerical additions to the Old Catholic Churches will take place in the near future, since they have both a stable organization, formularies, and a definite creed, and make their appeal to the ages when the Church of Christ was visibly one.

I have spoken at length on the Old Catholic movement, because it is the first in our time, and the fact that it has not been crushed out has had some effect on what has followed. I must now glance at some other movements, still in their infancy, which at once manifest the inner weakness of the Roman Church and tend to increase it. The history of France and its Church since the Revolution is unfortunately very little known in England. I am indebted to the fascinating volume of my friend the Rev. A. Galton for most of the details I am about to give, though since 1895 I have been personally and rather closely acquainted with some of the numerous priests who have seceded from the Roman Church in France, and have been working for reform. For the sake of brevity, I must begin at the French Revolution. In 1790 the Legislative Assembly dealt with the affairs of the Church, and, naturally enough, approached them from a democratic point of view, and under the impression that, under an aristocratic *régime* the rights of the poorer clergy had been very much neglected. Mr. Galton thinks that the *Constitution Civile du Clergé* which it drew up has been unfairly represented, and in defending it he has, I think, made out a good case. The attacks of Ultramontanes upon it may well be explained by remembering the fact that they are never satisfied unless they have the absolute control of State as well as Church. Next comes the *Concordat* between Church and State, approved by Napoleon in 1802. Of this it is sufficient to say that its provisions have been so manipulated by the Pope

and his advisers that it has given the absolute control of ecclesiastical matters into their hands, making the parish priests mere slaves to their Bishops, and the Bishops to the Pope, while the religious orders are under the control of the Papacy alone. The *Organiques* or administrative provisions of this *concordat* have never been accepted by the Pope, and the numerous changes of government which have taken place between 1802 and 1870 have practically prevented the State from insisting on them. We come next to the Third Republic established in 1870 on the ruins of the Second Empire. Strange to say, this Third Republic was at first ultra-conservative. Under the presidency of MacMahon, the old monarchy of the days before 1789 was just on the point of being restored, when the determination of the Legitimist heir to the throne to fly the white flag, the symbol of the *ancien régime*, put an end to the negotiations. It is hardly necessary to say that the Ultramontanes made the best use of their majority in the Legislature, and never, since France became a nation, was the Church so uncontrolled in that country as during the years immediately following 1870. A change, however, was at hand. The Republicans, under the leadership of Gambetta, first obtained a majority in the Chamber, and then in the Senate. That able statesman clearly discerned the direction from which danger threatened the Republic. *Le clericalisme, voilà l'ennemi*, was the pregnant phrase with which he inaugurated the campaign which may now be regarded as closed. One would not refuse to associate oneself with this sentiment, provided it were understood that by "clericalism" was meant the autocracy, not the legitimate influence, of the clergy. But this by the way. The Ultramontanes saw their danger clearly. In the Boulanger episode, and then in the cruel attempt to fix a false charge on Dreyfus, they endeavoured violently to suppress popular government by means of the army. We have not all, I hope, forgotten the proceedings at the Dreyfus trial, the savage abuse of opponents found in the Ultramontane organs *La Croix* and *La Libre Parole*, and pilloried by "Verax," a Roman Catholic, in the London *Times* of that date. These passionate outbursts culminated in the dastardly, and I believe entirely unprecedented, attempt to murder the counsel for the accused man. It is true that this was probably the attempt of a fanatic. But the memory of William the Silent, of Henry III., and Henry IV., of France will recall the fact to us how often Ultramontanism has stimulated and has never declined to use fanaticism for its own ends. The genuine Republicans in France were

naturally seriously alarmed. The immense wealth of the Orders, or "congregations," as they are sometimes termed, and the determined way in which it was employed to the prejudice of the popular cause, roused the Republicans to action not less resolute.

We must remember that these orders—so-called "religious"—are not simply, as many English people believe, associations of pious folk for purely religious purposes. Many of them, as a Roman Catholic correspondent of the *Guardian* has frankly admitted, are purely money-making institutions. More than one of the male orders is largely engaged in the manufacture of *liqueurs*. Many orders of women are occupied in laundry or dressmaking work. Not unfrequently they have been enabled to obtain for themselves exemption from the rules relating to sanitary matters, and hours of work, which are imposed on ordinary traders. And it is also matter of common knowledge among people abroad that a very lucrative traffic is carried on in the names of St. Joseph and St. Anthony of Padua, in the way of intercessions with the Court of Heaven for persons on earth who desire sundry material benefits.* The "teaching orders," too, had managed almost to monopolise the education of the young. It may fairly be said for the French Republic that, had the "congregations" kept themselves entirely to religious matters, instead of meddling in political intrigue, and trying to overthrow the form of government which the country had deliberately adopted, they would have been left alone. As it was, they were simply required to enter into reasonable engagements to behave like loyal citizens, and to conform to regulations of no very great severity laid down by the civil authority for its own protection. And, as Mr. Galton tells us, "the Republic has only applied laws which every French government has administered without question."† The point to which I would ask your attention is this: that three successive administrations have approved the measures taken in the interests of public order by MM. Waldeck-Rousseau and Combes, and that the separation of Church and State, including the turning the Bishops out of their palaces, has been passed by

* See the articles by St. Genix—a Roman Catholic—in the *Contemporary Review*, afterwards published in a separate form by the Imperial Protestant Federation.

† *History of Church and State in France*, p. 260. The words "without question" are undoubtedly too strong. But the Ultramontanes have frequently acquiesced in such application, and have only denounced it when they felt strong enough to do so.

large majorities in the Legislature and approved by an overwhelming majority of the people. That the rejection of the Church involves, for the present at least, the rejection of Christianity, must be regretfully admitted. But it is surely only fair to contend that the whole blame of this can hardly rest on the French people. If a similar event occurred in England, we should surely feel ourselves unable to deny that the bishops and clergy of the Church must bear at least some part of the blame. It seems at least a fair inference that there is something amiss with Ultramontane Christianity when it finds itself at once suppressed by the Government and abandoned by the people. Public opinion in this country appears in this matter, as it usually does, very much astray when it discusses the ecclesiastical or civil affairs of other countries. It may be questioned whether we always understand our own politics. Anyhow, we may honestly confess that we give ourselves a great deal too little trouble to understand the politics of other peoples.

Meanwhile, the state of religion in France has grown rapidly worse. A large majority of the people profess no religion at all. The priests, since 1895, have been steadily seceding from the Roman Church, and since their number reached a thousand they have ceased to be counted. The Protestant bodies, though released from the shackles imposed upon them by the *Concordat*, seem unable to mark out a course for themselves, or heal their differences. The English McAll mission, from which great things were at one time expected, seems unable to gain any permanent hold on the French people. The *Chrétien Français*, an organ of the seceding priests conducted by M. Bourrier, seems unable to make much way. Another ex-Roman priest who came to the front for a moment has retired into private life. Mons. Henri des Houx, who adopted the very sensible course of forming *Associations Cultuelles* under the new law, which should be served by canonically ordained priests independent of the Pope, unfortunately fell in with a wandering Archbishop without Suffragans named Vilatte, of whom, had I time, I could tell you a great deal, and thus made himself ridiculous. And to make oneself ridiculous in France is to fail. So that once hopeful plan has been abandoned. One ex-priest wrote to me last year from Nantes, in Brittany, to say that he had started services in accordance with the Book of Common Prayer, and that he had been asked to do the same in Paris. Amid all this sad scene of confusion and disorder there seems only one practicable scheme, that of the Dutch Old Catholics, themselves the theological representatives of Port Royal,

consenting to consecrate a Bishop or Bishops for France, elected by the seceding priests. In that quarter, at least, one might look for a definite theology, a definite organisation, and for connection with Churches on precisely the same basis in other lands. England is, of course, too insular to intervene, or even to take any steps to understand what is going on. And it is to be feared that the Dutch Old Catholic Bishops will insist on their priests being celibates. In the present state of feeling in France they might just as well insist that they should be Hottentots. France, if she does nothing else, imperatively demands that the priest of the future shall be a man and a citizen—that he shall not form one of a caste apart from the national life.

I will conclude with the briefest possible sketch of the state of things elsewhere. In Spain, what is called "Liberal Catholicism," which is hardly distinguishable from scepticism, is distinctly on the increase. And so unpopular are the monks and nuns in some of the Spanish cities, that they are frequently hissed as they pass along the streets. In Italy, the Ultramontanes were at one time forbidden by the Pope to take part in the elections, and great apprehensions were once felt on the side of the Government and a lively satisfaction expressed by the clerical party as to the probable result when the Pope withdrew his prohibition. An election was held in Rome in November, 1907, and the result was the victory of the Government candidates. I have already referred to Bolivia, which, in its treatment of the Roman Church has followed the example of France. And in other South American Republics repeated requests have been made, with the support of ecclesiastics of high standing, that the priests may henceforth be allowed to marry. But the Curia was forced to turn a deaf ear to the request. In America, the once well-known Father Hecker raised the banner of "Americanism," a sort of ecclesiastical Home Rule for the Roman Communion in the United States. He had the support of the learned Father Klein and of Archbishop Ireland. All the diplomatic skill of Leo XIII. was summoned up to meet this danger, and by his adroit manœuvres he was ultimately successful in scotching at least, if not killing, the movement before it gained a head.

In the Philippines a priest named Aglipay has contrived to detach from the Roman Church some two or three millions of natives, exasperated by the treatment they received from the Spanish friars, and he has been joined by some hundreds of priests.

In Ireland a spirit of rebellion against the working of the

Roman Church has long been secretly felt, and open expression has recently been given to it by Mr. F. Hugh O'Donnell, Mr. Michael McCarthy, Mr. Bart Kennedy, and a very recent writer whose *nom de plume* is "Pat." Even in England dissatisfaction with Ultramontane methods is now being openly avowed. A considerable number of complaints have been transmitted by Roman Catholics to *Truth* concerning the methods of Ultramontane finance.* At Ealing the standard of rebellion was openly unfurled by Father O'Halloran, and I understand he is still working there in defiance of his ecclesiastical superiors. More than this, I saw myself at the Old Catholic Congress at Olten the representatives of a body of Roman priests in this country who, as I was informed by leading Old Catholics, were sent to ascertain whether a branch of the Old Catholic Church could be established in this country.

The negotiations came to nothing. But they at least bore witness to the widespread spirit of unrest which pervades the Roman Church. I must say just a word or two about the "Modernists," as they are called.† I am not disposed personally to subscribe to all the opinions expressed by these writers. I must believe that they occasionally meddle with subjects which among Christians should be held sacred. But at least one heartily associates oneself with a protest against the antiquated theology and exploded scholasticism of the Roman Church, and to the recent condemnation of long strings of propositions by the Pope. It is worthy of note that the earlier "Modernists"—Schell, Kraus and Ehrhard in Germany, and Curci, in Italy—were ultimately compelled to submit to the judgment of the Holy See. It is a sign of the times that St. George Mivart and Father Tyrrell in England, Loisy‡ and Houtin in France, have *not* so submitted themselves. I understand, moreover, that the Pope's recent Encyclical has disturbed the minds of many of the most influential clergy of the Roman Church here in England. It is understood to condemn Newman. And many of these clergy are Newman's disciples.

The revolt is spreading. It includes dissatisfaction with Roman doctrines and methods. As far as one can see at

---

* These details have been made known from time to time through the public Press, English and foreign.

† See an article in the *Contemporary Review* for November, 1907, by Mr. Addis, formerly a Roman priest.

‡ I see by the *Standard* of 9th March, that Father Loisy has been excommunicated.—ED.

present, it appears that what in politics we call the democratic spirit, and what in the Christian Church is called the priesthood of the laity, is destined, some day, to deal a mortal blow to the Ultramontane cause.

Discussion.

Professor H. Langhorne Orchard, M.A., B.Sc., wrote :—

Chancellor Lias never reads a paper in this room without making us his debtors. We hope that God will prolong his life so that he may be able to address us on several future occasions. The valuable paper, to which we have been giving our attention, is of an interest hardly second to its importance. There are, however, spots in the sun. One is the absence of any definition of the term "Ultramontanism." Apparently it is to be understood in the same sense as Gladstone's "Vaticanism." Another spot is the use of the word "Roman," instead of "Roman Catholic." Such use is open to the objection that it suggests that either the Roman Catholic is the only Christian Church in Rome, or the Roman Catholics are connected in some special way with the ancient Romans.

The origin and history of the Old Catholic Movement, so ably brought before our Society, constitutes a formidable indictment not of Ultramontanism only, but of Roman Catholicism as a whole. The learned Chancellor points out that "the Roman system which had for centuries been strong enough to bear down all opposition, had created a timid and helpless laity, a still more timid and helpless priesthood, and a most timid and helpless Episcopate—all of whom were hopelessly ill-adapted for resistance of any kind."

The pathetic narrative conveys a warning and a hope. A warning against slipping the neck into the noose of authority, when that authority is without justification in reason. A hope which, as we have seen, is warranted by many signs of the times, that, within no very long time, a degrading tyranny may come to an end. The *Los Von Rom* will continue, and the last word has not been said about *the Associations Cultuelles*. Ultramontanism must collapse before the invincible working of that Wisdom which is wiser than men and that Strength which is stronger than men.

Lieut.-Colonel MACKINLAY.—I wish to add my thanks for the very instructive paper which we have just heard.

The progress of the Spanish Reformed Church (with which I am in sympathy) has, I think, been somewhat overstated. Its growth has indeed been slow.

I have lived for two years in Spain engaged in gospel mission work, and have kept in touch with it since, and so I have had some opportunity to understand the Spanish attitude. There seem to me to be three difficulties with which the reformed church in that country has had to contend.

(1) The Spanish nation strongly resented, I believe, the assumption of the authority of a bishop over those whom they considered to be heretics; I also believe that the patriotic Spanish instinct resented the action of the foreign Archbishop.

(2) The time has not yet arrived in Spain for any easy and wholesale severance from the Church of Rome: hence those who leave her are almost invariably actuated by deep spiritual motives; they run the risk of persecution and they incur a certainty of loss of some kind. Men and women under such circumstances are apt to make a clean sweep. Having suffered from priestly domination, the recognition of episcopal authority hardly commends itself to most of them at the present time.

(3) A really considerable number of gospel workers have gone to Spain during the last five-and-twenty years, chiefly from England. Few or none have gone with the idea of advocating an episcopal form of church government.

I therefore think that the present slight movement in Spain from Roman Catholicism is towards the formation of very simple congregations of believers, rather than to an episcopal form of church arrangement.

The SECRETARY (Professor HULL), in offering his cordial thanks to Chancellor Lias for undertaking to prepare the interesting paper to which they had all listened, admitted that it was with some feeling of hesitation he had invited the author to undertake the task, as he was a little doubtful whether or not the subject came within the range of those usually discussed at their meetings; but the manner in which the paper had been received had dispelled that

uncertainty. It would be observed that the subject had been treated in its historical aspect; and he (the speaker) considered that all great social, or religious, movements of the day were subjects properly open to discussion and examination by the Victoria Institute.

He confessed that he had from the commencement taken a great interest in the movement known in Germany as the "Alt Katholik," from the time when the illustrious Professor of the University of Munich, Dr. Von Döllinger, had headed the band of protesters against the modern assumptions of the See of Rome. He had long hoped for a reform movement within the Roman Church itself which, discarding the accretions of Romanism as laid down by the Council of Trent, and the still more recent innovations of the Vatican Council of 1870, might fall back on the doctrines of the Council of Nice—which were held by all the churches of the Reformation. The declaration agreed to at the Congress held in Lucerne in 1892 gives us the true position of Old Catholicism as "being no mere protest against the novel dogmas of the Vatican, but a return to the true Catholicism of the ancient and undivided Church, and at the same time a call to all Christian communities to unite upon this basis of Christian antiquity." This resolution was introduced by Professor Friedrich in an eloquent address (the *Record*, September 23, 1892). Surely such a call ought to be heartily responded to by members of all Reformed Churches! It was however, lamentable, to learn from the author's paper that in Protestant Germany, the government with Prince Bismarck at its head, should have taken up an unfriendly attitude to the New Reformation, though ultimately obliged to give it recognition. As an authentic statement of the enthusiasm with which the movement had been welcomed at the beginning of this century a paragraph from the Vienna correspondent of *The Times*, dated March 29, 1899, may here be inserted :—

"The extension of the revolt against the political influence of the Roman Catholic Church in this country is daily becoming more manifest. Constant evidence is forthcoming that should means not be found for counteracting it there is every likelihood of its assuming considerable proportions. The apprehension entertained that it would in course of time find an echo across the frontier proves to have been correct. An appeal on behalf of the agitation, just issued by the Berlin branch of the German Evangelical Association, which is specially devoted to assisting the movement in Austria, is announced in this evening's telegrams. The number

of conversions may not yet be very great, although, as a matter of fact, it is difficult to ascertain exactly on what scale they have taken place. It is known, however, that the movement has been making steady progress, and that it is intimately associated with the German Nationalist or Pan-Germanic agitation. Its significance does not consist in the actual number of proselytes. The mere fact that such an agitation should have made its appearance at all in Catholic Austria is a novel and profoundly interesting feature in the development of the great crisis through which this country is now passing."

Colonel Mackinlay's views regarding the position and prospects of the Spanish Reformed Church under the direction of Bishop Cabrera will doubtless be received with great respect, as they are the result of personal observation, though probably not very recent. He thinks the Spanish people resent the formation of an episcopal church in their midst as an intrusion. But the bishop of this reformed church was careful not to give any cause of offence, as he did not assume any territorial title, such as did the bishops appointed by the Pope, when on the advice of Cardinal Wiseman he nominated the present Roman Catholic hierarchy of this country. It may be questioned whether any form of pure Christianity, other than the episcopal, would have been understood by the people of Spain and Portugal. Certainly it would not have contained the elements of strength and solidity such as are afforded by the episcopal form of church government where there is a recognised head and centre of appeal in a large and wide tract of country. The Episcopal Church of Spain and Portugal is thoroughly evangelical in doctrine, and its progress in the short period may be judged by the following statistics taken from *Light and Truth* for January, 1908 :—

"In Spain there are ten churches or chapels, one Bishop, and eleven ministers.

In Portugal—ten churches and ten ministers.

There is an institution for training candidates for the ministry, presided over by Rev. J. S. Figueiredo. Mission services are held in a large number of towns and villages.

There are twenty schools in charge of forty teachers, and there are twelve licensed preachers. More than 2,000 children attend the schools, and all this work has had to be carried on in the face of opposition and persecution, and within a period which we can all recollect." There is, however, plenty of room for the work

of non-episcopal evangelists such as those Colonel Mackinlay refers to.

As regards Mr. Marston's statement, the question arises, is it well authenticated? The Pauline doctrine of Justification by Faith must be placed in connection with that of St. James, "Faith without works is dead" (Jas. ii, 14–17). Perhaps it is this two-fold doctrine that is the vital place in the Old Catholic Church, but we need more light before pronouncing judgment on a matter outside our knowledge, and indeed, outside the scope of Mr. Lias's.

The discussion was continued by Mr. ROUSE, who gave an account of Dr. McAll's mission work in Paris, by the Rev. Dr. NOYES, Rev. R. FAITHFUL DAVIES, Mr. W. SOLTAU, and the Rev. H. J. R. MARSTON, who, in thanking the author, expressed the opinion that the reason the Old Catholic movement had so slowly expanded was that its leaders had not grasped what almost all the Reformers of the sixteenth century had held as the central and vital place in Christianity, namely, the doctrine of St. Paul, "justification by faith."

The thanks of the meeting having been conveyed to the author in a few appropriate words by the CHAIRMAN, and the AUTHOR having replied, the meeting separated.

Postscript.—Since the above was in type it has been authoritatively stated that a branch of the Old Catholic Church is being organised in England, as will be seen by the following statement in *The Guardian*, April 8th, 1908:—

AN OLD CATHOLIC MOVEMENT IN ENGLAND.

[From our Old Catholic Correspondent.]

The organ of the Dutch Old Catholic Church, *De Oud Katholiek*, announces in its April number that on February 18th a meeting of Roman Catholic clergy and laymen was held at Chelsfield, the object of this gathering being to choose a Bishop independent of Rome, who is to receive his Consecration at the hands of Old Catholic Bishops. Seventeen priests and sixteen lay-people are said to have been present, and they elected as their pastor the Rev. A. H. Mathew, who claims to be Earl of Llandaff. The Bishop-elect was ordained priest in 1878 by the Roman Catholic

Archbishop of Glasgow, and was parish priest up to the year 1898, when he severed his connection with St. Mary's, Bath, and withdrew from all priestly functions. This step was the result of the doubts he had about the validity of the Vatican Decrees of 1870. The Dutch paper is in a position to state that the confirmation of this election and the observance of all canonical formalities has been placed in the hands of the Old Catholic Episcopate. Should the Bishops find, after careful examination, that no obstacles to the Consecration of a Bishop exist, they will comply with the wish of the leaders of the movement. It appears that a central Committee has been formed, with its headquarters at Kensington. The Rev. Mr. Keefe is given as Vicar-General, while the Revs. J. Higgins, A. Besanville, and C. Carey, and two laymen are named as assessors. Organised communities have been called into existence at Birmingham, Nottingham, Brighton, Hull, Ealing, Bromley, Orpington, and Chelsfield. I write this under an impression that the eventual Consecration by Old Catholic Continental Bishops of an Englishman for a number of English congregations may have far-reaching consequences.

ORDINARY GENERAL MEETING

WAS HELD IN THE ROOMS OF THE INSTITUTE, ON MONDAY, APRIL 6TH, 1908.

COLONEL C. E. YATE, C.M.G., C.S.I., IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

ELECTION :—Hamilton Bland, Esq., M.D., and the Reverend Edwin D. Kizer, were elected Associates.

The following paper was then read :—

THE AMERICAN FAUNA AND ITS ORIGIN.

By Professor J. LOGAN LOBLEY, F.G.S., F.R.G.S.

CONTENTS.

	PAGE
Introduction	190
Conspectus of the American Fauna	192
The American Fauna compared with that of the Old World	199
Fossil Vertebrate Fauna of America, Quaternary and Tertiary	209
Former Land Connections, Atlantis, Antarctica, etc.	214

INTRODUCTION.

THE American continent with its vast north and south extension and its complete isolation by water from all other lands presents a field for the observation of animal life of the greatest possible interest.

In latitudinal extension America ranges through 130 degrees, from 75° N. to 55° S. latitude, a distance of 9,000 miles or more than the diameter of the globe, a much greater north and south extension than that of the entire Old World or eastern continent, with all its austral insular adjuncts. Thus it extends

from the Arctic regions through the North Temperate zone through the tropics and through the South Temperate zone far towards the Antarctic Circle. But in addition to the latitudinal extension of America, its far-reaching and strikingly different physical features with great range of hygroscopic characters over widely separated areas, all contribute to the variety of conditions giving great climatic diversity. Mountains extend continuously throughout the entire length, rising in some of their peaks to over 20,000 feet, and enclosing almost rainless areas, while low plains with innumerable rivers and streams give regions abounding with water and atmospheric humidity little above sea-level.

The range of climatic and physical conditions that affect animal life may therefore be said to be as great within the bounds of the American continent as in the whole world, for the superior elevation of the Himalayas over the Andes is above the altitude at which animal organisms live, since even the adventurous mountaineers who have recently ascended the Himalayas to over 23,000 feet could not continuously live on the summits they so arduously gained.

Were the American portion of the land area of the globe continuous with the other portions, there would be nothing remarkable in finding in the western, a diversity of animal life equal to that of the Eastern Hemisphere, nor would it be surprising to find all the types of the one represented in the other. But the interposition of water as separating seas is such a formidable barrier to the migration of land animals, that the subject of the fauna of America acquires therefrom additional interest both with regard to its present features and to the indications its consideration affords of past geographical conditions and geological changes.

America cannot, however, be regarded as a single zoo-geographical area, since zoologists have long been impressed by the great difference between the general character of the fauna of its southern and that of the fauna of its northern extension, and they have therefore regarded these two portions as distinct zoological provinces or regions. In accordance with this view, Dr. Sclater constituted them two of his six zoological regions of the globe. The southern part of America, but including the West Indian Islands, Central America, and the eastern and western parts of Mexico, was named the Neotropical region, and the whole of the remaining part of the continent, the Nearctic region.

The subject of the distribution of the American fauna and

its origin is so extensive, that it is necessary for me to limit myself in this paper to the vertebrate terrestrial fauna, that is, to the mammals, birds, reptiles and amphibians, and even with this limitation it will be requisite to omit details and confine myself to a general statement of the leading features of the subject and the conclusions to which they point.

So much zoological research and so much investigation of zoological distribution has been carried out during the last half century, and so voluminous has been the literature on these subjects that I venture to think the present time is not inappropriate for such a review as is here attempted. The works of Alfred Russell Wallace, Dr. Sclater, Andrew Murray, Lydekker, Scharff, the American palæontologists, Amhegino, Leidy, Cope, Marsh, Ortmann and Scott, the German authors Suess and Zeitell, and other authorities, contain such an abundance of material that they give to conclusions based thereon a character of approximate finality that could not be claimed for earlier generalisations.

Conspectus of the American Fauna.

When the fauna of America is looked at as a whole some striking features will be noted. Firstly, that not only is every one of the greater divisions of the animal kingdom, the sub-kingdoms and the classes, to use the simple old nomenclature, represented in the New World, but, with few exceptions, the orders also, for of the twenty-nine orders of living terrestrial vertebrata only four are wanting, and one of these, Proboscidia, was represented in quaternary times. And while this is so there is but one order peculiar to America, and this order is represented by only one species, the gipsy bird of Eastern Brazil, *Opisthocomus cristatus*.

This conspicuous general correspondence between the animals of the western and eastern hemispheres indicates the essential oneness of the animal life of the globe, and its common origin, and at once suggests the former existence of land connections where now there are separating seas.

Although this oneness or unity is the most commanding feature presented by a comprehensive view of the living fauna of America, there are diversities from the fauna of the Old World of no little interest and importance.

We are struck by the fact that the most conspicuous and abundant mammals of Europe, Asia and Africa, are entirely

absent from America, that the highest and the lowest are also absent, for there are no anthropoid apes and no monotremes; that Proboscidia is wanting and that Carnivora and Ungulata are but poorly represented. Excluding man, both the highest and the lowest of the Primates are absent, so that we look in vain for the lemurs as well as the higher apes. The great and widespread family of Equidæ is also absent, for neither horses nor asses are indigenous to any part of America. So, too, *Sus* or the common pig is wanting, and so also are our familiar oxen and sheep. Besides these the following well-known animals of the Old World are not to be found on the American continent:—

Camel.	Hare.	Rabbit.
Cat.	Hyæna.	Rat.
Elephant.	Leopard.	Rhinoceros.
Giraffe.	Lion.	Tiger.
Hedgehog.	Mouse.	
Hippopotamus.	Panther.	

Amongst the birds there are wanting in America, bird of paradise, bustard, emu, lyre bird, peacock, ostrich, pheasant, starling, vulture and gallus, or common barn-door fowl, and of reptiles, there are no vipers, land-lizards, gavials or chameleons.

Some of these Old World animals have, however, analogues which, if not specifically allied, have a generic or family relationship. Thus, the puma represents the lions and tigers; the bighorn, the sheep; the bison, the oxen; the llama, the camels; the peccary, the swine; the rhea, the ostriches and emus; and the condor of the Andes, the vulture of the Pyrenees.

On the other hand, there are genera indigenous to America which have no living representatives in the eastern hemisphere. The sloths, the armadillos and the ant-eaters of South America, are quite absent from the Old World, these animals constituting three families also that are confined to the western continent. A most noteworthy zoogeographical feature is the restriction of the humming-birds to America. These exquisitely beautiful little birds, of which no less than 390 species have been described, constitute the family Trochilidæ, and not one species of this family is found in any other part of the world.

When the fauna of America is more critically examined and compared with the fauna of the eastern hemisphere, many important and highly interesting differences are discovered.

Mammalia.

The order Primates, again excluding man, has no one family common to the Old World and the New, and the families Cebidæ and Hapalidæ of America are both platyrrhine or having broad nasal septa, and in this respect differ from all the Old World monkeys which are catarrhine. The latter, too, are all without prehensile tails which many of the American monkeys possess. The Hapalidæ, or marmosets, have neither prehensile tails nor opposable thumbs and, therefore, have not true hands.

Of the Cheiroptera, one family is peculiar to the New World. This is the Phillostomidæ, or the leaf-nosed bats. These, with the exception of one species in California, are confined to South America and include the blood-sucking vampire bats. The other families of this order, Vespertilionidæ and Noctilionidæ are well-known bats in all the six zoological regions.

Of the Insectivora, only three families out of nine are represented in America, and of one of these, Centelidæ, there are only two species which are confined to the West Indies. The Talpidæ, or moles, have six species in America, and the shrews, twenty-four species, but confined to the northern part or the Nearctic region.

The great order Carnivora contains one family, the Procyonidæ, which is exclusively American. The typical genus Procyon gives the well-known racoons, and there are three other genera. These comprise eight species in all and chiefly inhabit South America, though one ranges as far north as California. The Felidæ, so conspicuous in the Old World, is represented by only a few species of the genus *Felis*. The puma, *Felis concolor*, ranging through 110 degrees of latitude, has the greatest range of any carnivore. The other species include the jaguar, *Felis onca*, and four lynxes or wild cats, though they differ from the *Felis catus*, the wild cat of Europe. The Canidæ, comprising our dogs, wolves and foxes, is a family well represented by species of the genus *Canis* to be found in all parts of America from the extreme north to Patagonia. The wolves, *Canis lupus*, are not, however, in South America, being there replaced by jackals and foxes. One genus of Canidæ, *Icticyon*, or the bush dog, is quite peculiar to America, and is restricted to the Brazils and Guiana. World-wide though the Canidæ may be said to be, they are not in the West Indies. Mustelidæ, comprising the weasels, otters, badgers, skunks and gluttons, is a family largely represented in America both in the north and the south, though the badgers have but one

species in South America. The glutton or wolverine, *Gulo luscus*, is restricted to the cold regions of the north of both the Old and New World, but in America it comes as far south as Lake Superior. Of the Ursidæ or bears, the most abundant is the grizzly bear of the Rocky Mountains, *Ursus horribilis*, which is closely related to the common brown bear of Europe, while the spectacled bear, *Ursus ornatus*, is restricted to the Andes of South America. The great white bear, Thalassarctos, or polar bear, *Ursus maritimus*, is, of course, confined to the Arctic coasts of the continent.

Of the order Ungulata there is a somewhat remarkable representation in America. The three conspicuous ungulates of the Old World, the horse, the ass, and the pig, are wanting, and the sheep is only represented by the bighorn, *Ovis canadensis*, of the north-west mountains, while the tapirs have four out of six species in the Neotropical region. The reindeer, *Rangifer tarandus*, of America differs somewhat from the reindeer of the Palæarctic region, as was explained in my paper on the fauna of Europe, and it ranges further south. In Labrador, the caribou, as it is called, may be found in herds of thousands. The elk or moose deer, *Alces machlis*, ranges southwards from the Arctic coasts to 45° N. latitude. The Bovidæ are not at all represented in the Neotropical region, being confined to North America, where the bison until recently was in countless numbers on its great prairie lands.

The musk ox, *Ovibos moschatus*, partakes of the character of both the ox and the sheep of Europe, but it is confined to the barren grounds, or great desert regions of the extreme north of the continent bordering the Arctic coasts. The prongbuck, *Antilocarpa americana*, is also confined to North America, but to the more southern latitudes of the prairies. The mountain goat, *Haploceros montanus*, seems to be confined to the northern parts of California. The American ungulates of the family Camelidæ are the llamas and the alpacas that form the four species of the genus *Auchenia*. These are entirely confined to South America.

The rodents, which number as many as 159 genera and 1,400 species, are largely represented in America, and no less than five families of the order Rodentia are not to be found in any other part of the world. These are the pouched rats, the haploodons, the chinchillas, the arboreal porcupines, and the guinea-pigs. The very widespread and well known family of Muridæ, with 87 genera and 730 species of rats and mice and their congeners, has many genera well represented in America, both

in the south and the north, and yet the typical genus Mus, or true mice and rats, with 130 species, including our own common house mouse, *Mus musculus*, and the brown rat, so abundant in London, is not to be found represented by a single indigenous species in either North or South America. On the other hand, the musk rat, *Fiber zibethicus*, and the genus *Heteromys*, are confined to the western continent. The jerboas or jumping mice have one species in North America, and one of the two species of beaver, *Castor canadensis*, ranges from Labrador to Mexico. The squirrels have in all 239 species. Of these twelve are in South and 82 in North America, but our lively little friend, the English squirrel, *Sciurus vulgaris*, is absent from both. The prairie-dogs, as they are called, *Cynomys ludavicianus*, are altogether American, but the true marmots, *Arctomys*, are both in America and Europe. Of Leporidæ, hares and rabbits, sixty-one species have been described, and of these twenty-five are American, but only one is in South America. The common hare of England, the mountain hare of Ireland and Europe, and the European rabbit are all three absent from America. A species of the picas or tailless hares, *Lagomys*, is found in the Rocky Mountains, and the coypu, a large beaver-like water rat, *Myopotamus coypu*, is well known in Peru and Chili. The family of rodents called Octodontidæ has sixty-eight species in the Neotropical region, and of these twenty-nine are peculiar to the West Indies.

The order Edentata has three families out of five in America, but all the three, comprising thirty-four species, are confined to Southern and Central America, or the Neotropical region. They are some of the most characteristic American animals. The sloths, forming the Bradypodidæ, and the ant-eaters forming the Myrmecophagidæ are arboreal, and inhabit the great forests of South America, but the armadillos, forming the Dasypodidæ, range throughout the Neotropical region.

The marsupials have a remarkable distribution, since they are confined to the Australian region and America, and of the thirty-nine genera comprising the order only two are to be found in America. These are Didelphys, with twenty-five species of opossums, and Chironectes, the water opossum. All except one species, *Didelphys californica* which is in Mexico and California, are inhabitants of the Neotropical region.

The lowest order of Mammalia, Monotremata, is altogether absent from the American continent, as it is from all the other zoogeographical regions except Australia.

Aves or Birds.

The Avian Fauna of America is conspicuously large and varied, much of it displaying vividly coloured plumage. Forests of vast extent in low-lying tropical regions are the habitats of innumerable species of insects, and so abundant food is provided for birds while uplands, hills, and mountains rising above the snow-line favour both the abundance and the richly varied bird-life of America.

Of the order Passeres, which includes sparrow-like and perching birds, and comprises nearly 6,000 species, a larger number than any other order of birds, there are twenty-eight out of fifty-one families represented in America, and of these fourteen are peculiar to the New World, while twenty-three Old World families of Passeres are absent from America. Dr. Russell Wallace estimates the number of species of Passeres in the Neotropical region at no less than 1,900.

The order Picariæ, including such birds as woodpeckers, kingfishers, and many richly plumaged birds, is especially conspicuous in America, to which seven of its twenty-five families are confined. Certainly the most remarkable feature of American ornithology is that afforded by the 390 species of one of the families of Picariæ, the Trochilidæ or humming birds. This highly differentiated family of small birds with refulgent plumage, as has been before noted, is entirely confined to the New World and almost restricted to the Neotropical region, for the Nearctic region gives only six of the 390 species. In Central America there are 100 species, fifteen in the West Indies and 290 species in South America proper.

Parrots, macaws and the like, forming the order Psittaci, are almost confined to the tropics, and in the Neotropical region are two families of Psittaci, Conuridæ and Psittacidæ, giving 141 species.

The Conuridæ are exclusively American, and one species ranges as far southwards as the Straits of Magellan, and another ranges northwards into the United States.

The order Columbæ, or pigeons, has in America about eighty species, chiefly inhabiting the Neotropical region. These birds are relatively less abundant in America than in the Australian region, and appear to favour islands rather than continents.

The Gallinæ, poultry and game birds, are well represented in the New World, although the type genus Gallus, our common fowl, is wanting, as are also the peacock and sand grouse, while the turkey, *Meleagris*, is an essentially American bird.

The order Opisthocomi has been constituted to contain the *Opisthocomus cristatus* which cannot be placed in any other family, and is exclusively American, inhabiting Guiana and Eastern Brazil, where it is called the Cigana or gipsy bird.

Birds of prey, Accipitres, have four families out of six in America. The Vulturidæ has been divided into two subfamilies, one the Vulturinæ, true vultures, being confined to the Old World, and the other, the Sarcorhamphinæ, to the New World. This latter contains the great condor, *Sarcorhamphus condor*, which soars to very high elevations in the Andes.

The Grallæ, waders and running birds, have a large representation in America. Of the nineteen families fifteen have species there, and of these seven are confined to the New World.

Of the order Anseres, or swimming birds, each of its eight families is represented in America, and five are in both North and South America. The Antarctic Penguins appear on the coast of Peru and the Arctic Columbidæ, auks, guillemots, etc., in the northern part of the continent. The inland family, Anatidæ, ducks, geese and swans, range all over both North and South America.

The Struthiones, or wingless birds, have in America a very small representation, the Rhea, with three species, being the only genus of the order to be found in the New World.

Reptilia and Amphibia.

The reptilian and amphibian fauna of America is, like the avian, chiefly developed in the southern part of the continent.

The order Ophidia, or snakes, has fifteen out of twenty-five families in America chiefly confined to the tropical and forest regions, though the rattlesnakes may be found as far northwards as Canada on the east and British Columbia on the west. The great boa is confined to tropical America, but one species of the same family, Pythonidæ is in California. The family Viperidæ, which gives to this country our only venomous snake, is entirely absent from America.

Of the order Lacertilia, or lizards, there are fifteen out of twenty-seven families represented in America, and of the fifteen no less than eight are peculiar to that continent. The Iguanas have a few species in the Fiji and Galapagos islands, and are, it is said, in Australia, but with such exceptions these interesting reptiles, extending to 236 species, are American. On the other hand, chameleons are quite absent from both North and South America.

While both crocodiles and alligators are in America, the genus *Alligator* is restricted to that continent ranging southwards from the Lower Mississippi, but it is not in the West Indian islands. The third family of the order Crocodilia, Gavialidæ, is entirely absent from the western continent.

The order Chelonia has all its families represented. Tortoises are abundant in both North and South America, and the marine turtles are in the warm seas on the coasts of the tropical regions.

Of the Amphibia, six out of twenty-two families are peculiar to America, and all the others except two are to be found in one or other parts of the continent, so that there are twenty out of twenty-two families represented in the New World. Of the salamanders there are several genera, of the toads six genera, and of the frogs eight genera. *Rana*, the typical genus of frogs, is not in South America, but abundant in Central and North America. The well known frog of this country, *Rana temeraria*, and the edible frog of France, *R. esculenta*, are, however, not known in America. The remarkable animals called tree frogs have many species in America, three families of these amphibians being represented, two in the Nearetic and all three in the Neotropical region.

The American Fauna compared with that of the Old World.

Such is the great difference between the vertebrate faunas of the northern and southern parts of America that it is necessary to consider each separately, and to compare the one with the fauna of the northern and the other with that of the southern part of the Old World. Thus the faunas of the Nearetic and Palæaretic regions may be conveniently and usefully compared, and the fauna of the Neotropical region with the animals of the southern lands of the Old World, comprising the Ethiopian, Oriental and Australian regions, which I will call by the comprehensive term, Palæotropical.

For brevity as well as clearness these comparisons are best stated by a tabular arrangement. In these, as given below, the first column contains the names of the families represented in the American region and not in the corresponding one of the Old World, in the second and middle column is stated the families common to both the New World and the Old World regions; and in the third column are the names of the Old

World families that are not represented in the corresponding zoological region of America.

The Nearctic and Palæarctic Faunas compared.

Nearctic families not in Palæarctic Region.	Families common to both Regions.	Palæarctic families not in Nearctic Region.
	MAMMALIA.	
	Primates.	
		Cynopithecidæ.
	Cheiroptera.	
Phyllostomidæ.	Vespertilionidæ.	Pteropidæ.
	Noctilionidæ.	Rhinolophidæ.
	Insectivora.	
	Talpidæ.	Macroscelididæ.
	Soricidæ.	Erinaceidæ.
	Carnivora.	
Procyonidæ.	Felidæ.	Viverridæ.
	Canidæ.	Hyænidæ.
	Mustelidæ.	Æluridæ.
	Ursidæ.	
	Otariidæ.	
	Trichechidæ.	
	Phocidæ.	
	Ungulata.	
	Suidæ.	Equidæ.
	Cervidæ.	Camelidæ.
	Bovidæ.	
	Hyracoidæ.	
		Hyracidæ.
	Rodentia.	
Saccomyidæ.	Muridæ.	Spalacidæ.
Haploodontidæ.	Dipodidæ.	Myoxidæ.
Cercolabidæ.	Castoridæ.	Octodontidæ.
	Sciuridæ.	Hystricidæ.
	Lagomyidæ.	
	Leporidæ.	

Nearctic families not in Palæarctic Region.	Families common to both Regions.	Palæarctic families not in Nearctic Region.
	Marsupialia.	
Didelphyidæ.		
	BIRDS.	
	Passeres.	
Chamæidæ.	Turdidæ.	Timaliidæ.
Carebidæ.	Sylviidæ.	Panuridæ.
Mniotittidæ.	Cinclidæ.	Pymonotidæ.
Vireonidæ.	Troglodytidæ.	Oriolidæ.
Icteridæ.	Certhiidæ.	Muscicapidæ.
Tanagridæ.	Sittidæ.	Nectariniidæ.
Tyrannidæ.	Paridæ.	Dicæidæ.
	Laniidæ.	Sturnidæ
	Corvidæ.	Pittidæ.
	Ampelidæ.	
	Hirundinidæ.	
	Pringillidæ.	
	Alaudidæ.	
	Motacillidæ.	
	Picariæ.	
Trochilidæ.	Picidæ.	Yungidæ.
	Cuculidæ	Coraciidæ.
	Alcedinidæ.	Moropidæ.
	Caprimulgidæ.	Upupidæ.
	Cypselidæ.	
	Psittaci.	
Conuridæ.		
	Columbæ.	
	Columbidæ.	
	Gallinæ.	
Cracidæ.	Tetraonidæ.	Pteroclidæ.
	Phasianidæ.	Turnicidæ.
	Accipitres.	
	Vulturidæ.	
	Falconidæ.	
	Pandionidæ.	
	Strigidæ.	

Nearctic families not in Palæarctic Region.	Families common to both Regions.	Palæarctic families not in Nearctic Region.
	Grallæ.	
	Rallidæ.	Glaredidæ.
	Scolopacidæ.	Otididæ.
	Charadriidæ.	Phænicopteridæ.
	Gruidæ.	
	Ardeidæ.	
	Plataleidæ.	
	Ciconiidæ.	
	Anseres.	
	Anatidæ.	
	Laridæ.	
	Procellariidæ.	
	Pelecanidæ.	
	Colymbidæ.	
	Podicipidæ.	
	Alcidæ.	
	Reptilia.	
	Ophidia.	
Pythonidæ.	Calamariidæ.	Typhloyidæ.
	Oligodontidæ.	Psammophidæ.
	Colubridæ.	Erycidæ.
	Homalopsidæ.	Viveridæ.
	Elapidæ.	
	Crotalidæ.	
	Lacertilia.	
Chirotidæ.	Zonuridæ.	Trogonophidæ.
Teidæ.	Scincidæ.	Amphisbænidæ.
Chalcidæ.	Geckotidæ.	Varanidæ.
Iguanidæ.		Lacertidæ.
		Gymnophthalmidæ.
		Ophiomoridæ.
		Sepidæ.
		Agamidæ.
		Chamæleonidæ.
	Crocodilia.	
Alligatoridæ.		

Nearctic families not in Palæarctic Region.	Families common to both Regions.	Palæarctic families not in Nearctic Region.
	Chelonia.	
	Testudinidæ.	
	Trionychidæ.	
	Cheloniidæ.	
	AMPHIBIA.	
	Urodela.	
Sirenidæ.	Proteidæ.	
Amphiumidæ.	Menopomidæ.	
	Salamandridæ.	
	Anoura.	
Engystonidæ.	Bufonidæ.	Bombinatoridæ.
	Alytidæ.	Discoglossidæ.
	Hylidæ.	
	Polypedatidæ.	
	Ranidæ.	

From this tabular statement it will be found that there are twenty families of mammalia, forty of birds, and twenty of reptilia and amphibia, or no less than eighty families of vertebrates common to the Nearctic and Palæarctic regions, and that while there are forty-eight Palæarctic families not represented in the Nearctic region, there are only twenty-three Nearctic families not in the Palæarctic region.

It also appears that seven families of the order Carnivora are common to both regions, while only one, Procyonidæ, is confined to the Nearctic. Of birds fourteen families of the order Passeres are represented in both regions, and five of Picariæ, while of Accipitres, birds of prey, all four families are in both regions. Of Grallæ seven families are common and not one peculiar to the Nearctic region. The order Anseres, or swimming birds, has, like Accipitres, all of its families, seven, represented in both regions.

These facts compel the conclusion that the northern parts of the Old and New Worlds have been connected by land and that the animals of North America have, for the most part at least, been derived from migrants from the Palæarctic region.

The Neotropical and Palæotropical Faunas compared.

Neotropical families not in Palæotropical Regions.	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
	MAMMALIA.	
	Primates.	
Cebidæ.		Simiidæ.
Hapalidæ.		Semnopithecidæ.
		Cynopithecidæ.
		Lemuridæ.
		Tarsiidæ.
		Chiromyidæ.
	Cheiroptera.	
Phyllostomidæ.	Vespertilionidæ.	Pteropidæ.
	Noctilionidæ.	Rhinolophidæ.
	Insectivora.	
	Centetidæ.	Macroscelididæ.
		Erinaceidæ.
		Potamogalidæ.
		Chrysochloridæ.
		Soricidæ.
		Galeopithecidæ.
		Tupaiidæ.
		Talpidæ.
	Carnivora.	
Procyonidæ.	Felidæ.	Cryptoproctidæ.
	Canidæ.	Viverridæ.
	Mustelidæ.	Protelidæ.
	Ursidæ.	Hyænidæ.
	Otariidæ.	Æluridæ.
	Phocidæ.	
	Sireniæ.	
	Manatidæ.	
	Ungulata.	
Camelidæ.	Tapiridæ.	Equidæ.
	Suidæ.	Rhinocerotidæ.
	Cervidæ.	Hippopotamidæ.
		Tragulidæ.
		Camelopordidæ.
		Bovidæ.

Neotropical families not in Palæotropical Regions.	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
	Proboscidia.	
		Elephantidæ.
	Hyracoidea.	
		Hyracidæ.
	Rodentia.	
Saccomyidæ.	Muridæ.	Spalacidæ.
Chinchillidæ.	Sciuridæ.	Dipodidæ.
Cercolabidæ.	Octodontidæ.	Myoxidæ.
Caviidæ.	Echimyidæ.	Hystricidæ.
	Leporidæ.	
	Edentata.	
Bradypodidæ.		Manididæ.
Dasypodidæ.		Orycteropodidæ.
Myrmecophagidæ.		
	Marsupialia.	
Didelphyidæ.		Dasyuridæ.
		Myrmecobiidæ.
		Peramelidæ.
		Macropodidæ.
		Phalangistidæ.
		Phascolomyidæ.
	Monotremata.	
		Ornithorhynchidæ.
		Echidnidæ.
	BIRDS.	
	Passeres.	
Certhiidæ.	Turdidæ.	Timaliidæ.
Cærebidæ.	Sylviidæ.	Panuridæ.
Mniotiltidæ.	Cinclidæ.	Liotrichidæ.
Vireonidæ.	Troglodytidæ.	Phylloruithidæ.
Ampelidæ.	Certhiidæ.	Pycnonotidæ.
Icteridæ.	Sittidæ.	Oriolidæ.
Tanagridæ.	Paridæ.	Campephagidæ.
Oxyrhamphidæ.	Corvidæ.	Dicruridæ.

Neotropical families not in Palæotropical Regions.	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
Tyrannidæ.	Hirundinidæ.	Muscicapidæ.
Pipridæ.	Fringillidæ.	Pachycephalidæ.
Cotingidæ.	Motacillidæ.	Laniidæ.
Phylotomidæ.		Nectariniidæ.
Dendrocolaptidæ.		Dicæidæ.
Formicariidæ.		Ploceidæ.
Pteroptochidæ.		Sturnidæ.
		Artamidæ.
		Alaudidæ.
		Eurylæmidæ.
		Pittidæ.
		Paictidæ.
	Picariæ.	
Rhamphastidæ.	Picidæ.	Yungidæ.
Bucconidæ.	Megalæmidæ.	Indicatoridæ.
Galbulidæ.	Cuculidæ.	Musophagidæ.
Todidæ.	Trogonidæ.	Coliidæ.
Monotidæ.	Alcedinidæ.	Leptosomidæ.
Steatornithidæ.	Caprimulgidæ.	Coraciidæ.
Trochilidæ.	Cypselidæ.	Meropidæ.
		Upupidæ.
		Irrisoridæ.
		Podargidæ.
	Psittaci.	
Conuridæ.	Psittacidæ.	Palæornithidæ.
		Cacaturidæ.
		Platycercidæ.
		Trichoglossidæ.
		Nestoridæ.
		Stringopidæ.
	Columbæ.	
	Columbidæ.	Dididæ.
		Didunculidæ.
	Gallinæ.	
Gracidæ.	Tetraonidæ.	Pteroclidæ.
Tinamidæ.	Phasianidæ.	Turnicidæ.
		Megapodiidæ.

Neotropical families not in Palæotropical Regions.	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
	Opisthocomi.	
Opisthocomidæ.		
	Accipitres.	
	Vulturidæ.	Serpentariidæ.
	Falconidæ.	
	Pandionidæ.	
	Strigidæ.	
	Grallæ.	
Chiconididæ.	Rallidæ.	Glareolidæ.
Thinocoridæ.	Scolopacidæ.	Otididæ.
Cariamidæ.	Parridæ.	Gruidæ.
Aramidæ.	Charadriidæ.	Rhinochetidæ.
Psophiidæ.	Ardeidæ.	
Eurypygidæ.	Plataleidæ.	
Palamedeidæ.	Ciconiidæ.	
	Phenicopteridæ.	
	Anseres.	
	Anatidæ.	
	Laridæ.	
	Procellariidæ.	
	Pelecanidæ.	
	Spheniscidæ.	
	Podicipidæ.	
	Struthiones.	
	Struthionidæ.	Casuariidæ.
		Apterygidæ.
		Dinornithidæ (Extinct).
		Palapterygidæ (Extinct).
		Æphyornithidæ (Extinct).
	Reptilia.	
	Ophidia.	
Tortricidæ.	Typhlopidæ.	Xenobeltidæ.
Oligodontidæ.	Tortricidæ.	Uropeltidæ.

Neotropical families not in Palæotropical Regions.	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
Scytalidæ.	Calamariidæ.	Psammophidæ.
Crotalidæ.	Colubridæ.	Rachiodontidæ.
	Homalopsidæ.	Lycodontidæ.
	Dendrophidæ.	Erycidæ.
	Dryophidæ.	Acrochordidæ.
	Dipsadidæ.	Dendraspididæ.
	Scytalidæ.	Atractaspididæ.
	Amblycephalidæ.	Viperidæ.
	Pythonidæ.	
	Elapidæ.	
	Hydrophidæ.	
	Crotalidæ.	
	Lacertilia.	
Chirotidæ.	Amphisbænidæ.	Varanidæ.
Helodermidæ.	Lepidosternidæ.	Lacertidæ.
Teidæ.	Zonuridæ.	Chamæsauridæ.
Chalcidæ.	Gymnopthalmidæ.	Pygopodidæ.
Anadiadæ.	Scincidæ.	Aprasiadæ.
Chirocolidæ.	Geckotidæ.	Lialidæ.
Iphisadæ.		Sepidæ.
Circosauridæ.		Acontiadæ
Iguanidæ.		Agamidæ.
		Chamæleonidæ.
	Rhyncocephalina.	
		Rhyncocephalidæ.
	Crocodilia.	
Alligatoridæ.	Crocodilidæ.	Gavialidæ.
	Chelonia.	
	Testudinidæ.	Trionychidæ.
	Chelydidæ.	
	Cheloniidæ.	
	Amphibia.	
	Pseudophidia.	
	Cæciliadæ.	

Neotropical families not in Palæotropical Regions	Families common to Neo and Palæotropical Regions.	Palæotropical families not in Neotropical Regions.
	Urodela.	
	Salamandridæ.	
	Anoura.	
Rhinophrynida.	Phryniscidæ.	Xenorhinidæ.
Hylaplesidæ.	Bufonidæ.	Dactylethridæ.
Plectromantidæ.	Engystomidæ.	
Pipidæ.	Bombinatoridæ.	
	Alytidæ.	
	Pelodryadæ.	
	Hylidæ.	
	Polypedatidæ.	
	Ranidæ.	
	Discoglossidæ.	

This comparison between the land animals of the southern lands of the western and eastern hemispheres, reveals some striking facts. Altogether there are ninety-seven families of land vertebrates common to the two hemispheres. Of these, nineteen are mammals, forty-one birds and thirty-six reptiles and amphibians.

Of Carnivora, eight families are common; of Rodentia, five; while of birds there are, common, eleven families of Passeres, seven of Picariæ, all four of Accipitres, eight of Grallæ, and all six of Anseres. Of reptilia, fourteen families of snakes are represented in both New and Old Worlds, six of lizards and three of Chelonians; while of amphibians there are ten families of the order Anoura (toads, frogs, etc.), common to the two hemispheres.

On the other hand there is no family of Primates, none of Proboscidia, none of Edentata and none of Marsupialia, common to the Old World and the New, and as has been before stated, there is no species of the order Monotremata in America.

Fossil Vertebrate Fauna of America, Quaternary and Tertiary.

Although the affinities of the living fauna of the New World with that of the Old World are obvious, they are not so strongly marked or conspicuous as were the relations of the

American mammalian fauna of Quaternary and Tertiary times with the mammals now inhabiting the eastern hemisphere.

Recent geological and palæontological work in America both north and south, has brought to light a wonderful mammalian fauna that has been of the utmost value for both biological and distributional purposes.

In North America, Leidy, Cope and Marsh have disinterred and described the remains of many genera of extinct as well as of living types from the Post Pliocene deposits of Nebraska forming the so-called "Bad Lands," and from the Tertiaries of Colorado and Wyoming about forty genera have been obtained.

In South America, the caves of Central Brazil have furnished from the deposits on their floors a vast number of small bones, estimated at seven millions, and from these over 100 species of mammalia have been determined. The Post Pliocene and Pliocene beds of the Pampas gave many years ago the remains of large mammals of the orders Edentata and Ungulata, including the great Megatherium and the giant armadillo, Glyptodon, that are so prominent in our Natural History Museum.

Patagonian Tertiary fossils received the attention of Florentino Ameghino, who named a great number of species, and within the last ten years systematic explorations of the beds exposed near the sea on the eastern coast of Patagonia extending as far south as Punta Arenas on the Straits of Magellan have been carried out by the Princeton University of the United States, and the fossil fauna revealed has been critically examined, described and determined by eminent palæontologists and a sumptuously printed report of this important investigation has been published at the cost of Mr. Pierpont Morgan. The chief fossiliferous deposits called the Santa Cruz Beds, were found by Professor Ortman to be of Miocene age, and their fossils have largely added to the species and the genera of the Tertiary fauna of America.

The most remarkable feature of the American mammalian fossils is the abundance of the remains of families now extinct or very sparsely represented in the New World, but which are now conspicuous in the Old World, as, for example, those represented by horses, oxen, sheep, elephants, rhinoceroses, camels, lions and tigers; and the general result of a close examination is to find more generalised types in the older and more specialised types in the newer deposits.

The following is a brief summary of the American Quaternary and Tertiary vertebrate fauna.

In Primates, twelve genera allied to the Lemuridæ were found in the Lower Eocene of Wyoming, an altogether Old World living family, while the Miocene of North America and the Quaternary of the Brazilian caves contain remains of true monkeys but still of the American type, that is, Platarrhine, so that no Catarrhine monkey appears in either the fossil or the living fauna of America. This is very noteworthy, and has led to the conclusion by some that the monkeys of America have had a separate western origin.

Both in the Brazilian cave deposits and in the Miocene of America, species of the order Cheiroptera have been found quite like recent European species, our common bats.

Of Insectivoræ in the Post Pliocene a single tooth has been found, but in the Upper Miocene of Dakota there are two genera, *Lepictis* and *Ictops*, while in the Miocene of Colorado, Cope discovered four genera and in the Eocene of Wyoming, two others.

The fossil Carnivora of America indicate a former greater abundance of carnivores there than at present. In the Quaternary deposits of Texas there are two species of Felis as large as lions, four species of Canis larger than wolves, two bears and some extinct genera; and in the Brazilian caves there have been found five species of Felis, the remarkable *Machairodus*, or sabre-toothed tiger, which inhabited our Devonshire caverns, besides species of the families Canidæ, Mustelidæ, Procyonidæ, and Ursidæ. From the Miocene of Dakota, too, the bones of *Machairodus* have been obtained, and from the Miocene of Colorado and Dakota four species of *Canis* and three species of *Hyænodon*, an extinct genus that is a noteworthy illustration of generalised forms since it was allied not only to hyænas, but also to wolves, cats, and weasels. In the older Eocene beds of Wyoming and New Mexico, twelve genera of the order Carnivora have been found, six or seven of them allied to *Hyænodon*.

The greater approximation of the past fauna of America to that of the Old World is, however, most conspicuously shown by the great order Ungulata. As is well known all the present horses of America are descended from progenitors introduced into that continent since the Spanish conquest of Peru, and that the family Equidæ is not represented by any living indigenous American species. Yet the fossil remains of horses in the Western Continent are abundant, demonstrating that they once flourished in America and became extinct there before the recent period. From the Post Pliocene of North

America six species of *Equus* have been described, and in the South American bone caves the genus is also well represented. But this is by no means all, for when mammalian fossils of the older Tertiary deposits are examined it is found that horse-like animals lived quite through Tertiary times to as far back as Lower Eocene. And it is a very important scientific fact that the differentiation of these fossils from the present equine type of Europe and Asia, *Equus caballus*, increases with the geological age of the deposits in which they occur. So markedly is this the case that, from American fossils, a chronological series of genera of Equidæ gradually approximating to *Equus caballus* can be constructed. The older the genus the smaller the animal and the more unlike is the foot to the single-toed hoof of the horse.

Series of American Equidæ.

Equus.	Single-toed hoof.	Quaternary.
Pliohippus.	Size of ass, single-toed.	Pliocene.
Protohippus.	Two small lateral toes but functionless.	„
Hipparion.	„	„
Auchippus.	„	„
Merychippus.	„	„
Myohippus.	„	„
Anchitherium.	Size of large goat, three toes.	Miocene.
Miohippus.	„	„
Mesohippus.	„	„
Orohippus.	Size of fox, four toes.	Eocene.
Eohippus.	Four toes and one undeveloped.	„
Phenacodus.	Five toes.	Lowest Eocene.

There are also forms such as the Parahippus, the Lophiodon, and the Palæosyops, which are more generalised and partake of the characters of both Hippidæ and Tapiridæ.

Again, the rhinoceros is not represented in the present American fauna, but in Pliocene and Miocene times the family Rhinoceratidæ was represented in America by the genera *Rhinoceros, Aceratherium, Hyracodon,* and *Diceratherium.* The remarkable extinct family Brontotheridæ, some of the members of which attained the size of elephants, with four toes to the front and three to the hind feet, has been given to science by the Miocene of Colorado.

The Arctodactylæ or even-toed ungulates were also abundant in America in Tertiary times, although there are now but few indigenous species. Remains of Suidæ, swine, represented at present only by the Peccaries, are numerous in Pliocene and Miocene deposits. *Hyopotamus* is from the Miocene of Dakota, Delawar, and Colorado, and *Elotherium* (placed by Marsh in a new order, Tillodontia), and three other genera are from the Miocene of Oregon and the Eocene of Wyoming and New Mexico. The remarkable family Camelidæ which has now only two genera in the Old World and one genus in the New World, had in the Tertiary period five genera in America of which one, *Pæbrotherium*, combined resemblances to the Old World camel and the New World llama. The Bovidæ which now has in America only the bison and the bighorn sheep as indigenous animals, had in Tertiary times seven genera, one, *Agriocharus*, going back to the Eocene. The two well-known genera, *Palæotherium* and *Anoplotherium*, that Cuvier made famous by his descriptions of the mammalian fossils of the Upper Eocene of the Paris Basin, are in the Eocene of the Pampas of Argentina in South America, and furnish another link connecting the American Tertiary fauna with that of Europe.*

The Proboscidea are now quite absent from America, but in the Post Pliocene and Pliocene of North America there are two species of elephants and two species of mastodons, and in the Newer Pliocene one species of each genus, while in South America there is a species of *Mastadon* in the Brazilian cave deposits and another in Andean beds.

The extensive order Rodentia was, as it is at present, well represented in America, and the remains of members of the family Muridæ give in Pliocene, Miocene and Eocene beds, several extinct as well as recent genera. Species of twenty genera representing six families of Rodentia have been described from the Santa Cruz beds of Patagonia by Professor Scott of Princetown University.

Fossil Edentata are very important. Those from the Quaternary deposits of the Brazilian caves and the Pleistocene and Pliocene beds of Argentina, Patagonia and Paraguay, are well known. These edentates are of great size, and include the gigantic *Megatherium*, *Mylodon*, *Scelidotherium*, *Megalonyx*, *Glossotherium*, and the great armadillo, *Glyptodon*. Mr.

---

* Dr. Smith Woodward informs me that this is an error; and that the jaws thus originally named by Oscar Schmidt belong to the genus *Proterotheriida*.—Ed.

Lydekker has recently examined and determined the remains of fifty-five species of edentates from the Pleistocene beds of Patagonia. In North America have been found *Megatherium*, *Megalonyx* and *Mylodon*, and from the Pliocene of California, Marsh has described the genus *Morotherium*.

From the Miocene Santa Cruz beds, Scott has determined species of twenty-nine genera of Edentata. These were very much smaller animals than the Pleistocene species before known, and approach the size of the South American living edentates.

Of Marsupialia which now gives the opossums to both South and North America, there are the remains of numerous species in the Brazilian caves, and the genus *Didelphys* has been found in the Post Pliocene deposits of South Carolina. The Miocene beds of Santa Cruz give a remarkable assemblage of Marsupial fossils, for Sinclair has described twenty species, while no less than eighty-seven had been previously named by Ameghino.

No remains of the lowest order of Mammalia, Monotremata, have been as yet discovered in America, and as there is no living American species, we have no evidence of a monotreme ever having existed in the New World.

Of remains of the class Aves, or birds, little need be said. The prolific cave deposits of Brazil have yielded many small avian bones from which thirty-four species of birds have been determined, including two species of *Rhea* and a species of the curious genus *Opisthocoma*, both genera being exclusively American. The turkey, *Meleagris*, has been found in both Post Pliocene and Miocene deposits.

The Quaternary and Tertiary Reptilia and Amphibia of America have not given many species, though tortoises are numerous in the Miocene and Eocene of North America, and several species of crocodile and a chameleon have been found in the Eocene. This is important, since there are no chameleons now in America. A large salamander, allied to the living *Menopomo* of North America, has also been discovered.

Former Land Connections, Atlantis, etc.

That America has been connected by land with the Old World will be evident, I think, from the facts that have now been stated, and that the animals at present living there have had their origin either directly or by descent mainly from species which have inhabited the eastern hemisphere, can scarcely be doubted. But there remains the question, what and where was that former connecting land? Was it the

Atlantis of Plato in Mid Atlantic, was it an Antarctic land or archipelago extending between the southern extremities of Africa and South America, and connecting these with New Zealand and Australia, was it a northern land uniting Labrador and Greenland to Europe, and Alaska and British Columbia to Asia, or were there more than one or even two terrestrial bridges for the passage to the New World of the ancestors of its present animals?

This question has been so much discussed that a large number of authors of eminence can be quoted who have written both tentatively and very decidedly on the subject.

The affinities of the fauna of the northern parts of America and that of the northern parts of the Old World, or of the Nearctic and Palæarctic regions, are so many and so strong, and the fossil fauna of the two regions is so confirmatory, that a former land connection between them is a conclusion that at once suggests itself. And when the present relative position of these two great land areas that are separated by but narrow seas, and the comparative shallowness of these seas, are considered, there is no difficulty in admitting this conclusion.

Such land connections would be produced by elevations by no means greater than those we know to have taken place in Europe and Asia since Eocene, or indeed, since Miocene times. There is continuous sea-bottom of less than 2,000 fathoms depth between Labrador, Greenland, Iceland and Scotland, and the greatest depth between Siberia, Kamtchatka and Alaska, is also less than 2,000 fathoms, so that an elevation of the floor of the northern seas above its present level of 12,000 feet, would give these two great zoological bridges.

Great elevations have taken place since Eocene times in Central Europe where the Alps show Tertiary rocks at 11,000 feet above sea-level, and of much more than 12,000 feet in Asia where the Himalayas show Pliocene deposits at 14,000 feet above the level of the sea; and a change of level of 12,000 feet in later geological times in one or more areas makes it difficult to refuse to admit possible similar changes of level in other areas.

Nor would there be any climatal difficulty in animal migration by these northern lands. From the general mildness of the climate of the northern regions in pre-Glacial times, there would be no impediment to the spread of a temperate fauna that present boreal conditions would interpose.

Thus we may regard it as established that the northern part of North America was joined on the east to Europe, and on the

west to Asia, giving two great land bridges by which the terrestrial animals of the Old World could travel away from their centres of origin, some northwards and westwards and some northwards and eastwards, until what is now North America was reached, colonised and populated.

We cannot therefore, I think, hesitate to conclude that, after allowing for migrations from the south, much of the fauna of the Nearctic region is descended from animals, some of which came from Europe by a north-west land extending to Iceland and Greenland and on to Labrador, and some of which came from Asia by a north-east land extending from Siberia by Kamtchatka and the Aleutian Islands to Alaska and Western Canada.

So far I do not think there is anything here stated that will be taken exception to by zoogeographers. But now we approach a very debatable portion of our subject. This is the question of the origin of many animals in North America and the West Indies having affinities with species of the Mediterranean and North African areas of the Old World, and of the South American fauna which is so different from the fauna of North America, while it has such strong affinities with the fauna of the southern extremities of the land areas of the eastern hemisphere.

On this question eminent authorities differ very widely, and the evidence and arguments in support of the different views are so important and abundant that it will be impossible to give here even the briefest statement of them, but a summary may perhaps be attempted.

The relations existing between South American fossil mammals and mammals of the Australian region are very pronounced. The discovery of a large number of fossil marsupials both in Brazil and Patagonia is of great importance, and when it is borne in mind that marsupials are not to be found out of America except in the Australian region and that only two species, both of the genus *Didelphys*, are in North America, and that, moreover, while the fossil marsupials of Europe and the British Islands are of Mesozoic and Eocene ages the Patagonian fossils are Miocene, it will be seen that there is strong evidence of land connection with the Australian region in Tertiary times.

But in addition to the mammalia, the Patagonian Tertiary invertebrate fauna gives 151 species which, with the exception of two or three, have not been obtained in North America nor indeed in the northern hemisphere, while fifteen are in New

Zealand and eleven others are closely allied to New Zealand species, so that Dr. Ortman remarks that the only clearly marked relations of this fauna are with Chili, New Zealand and Australia, but speaking of the entire fossil fauna of the Patagonian Miocene he writes: "Thus we see that, in the Miocene Patagonian beds, we must distinguish two chief faunal elements: a tropic-sub-tropical one, which shows relations to the tropical parts of the rest of the earth (and through these with the sub-tropical faunas of the northern hemisphere in Europe and North America), and an antarctic element which is peculiar to the southern hemisphere, and which shows relations only to the faunas belonging to or connected with ancient Antarctica."*

The "tropic-sub-tropical" element of which Ortman speaks and which is conspicuous, points undoubtedly to a former land connection with Africa to which Madagascar was united in Tertiary times.

Such a land connection of the southern terminations of the continents was suggested to Hooker as long ago as 1847 by the affinities of the floras of these sub-antarctic lands. A relationship between the Mollusca of Brazil and Africa was shown to exist by Von Ihering. The edentates, sloths and armadillos, now living, and the gigantic extinct forms, *Megatherium*, *Mylodon*, *Glyptodon*, etc., of South America, are unlike anything in the Palæarctic region either living or fossil, and are allied only to two families in Africa and one in the Oriental region. Africa, too, is the habitat of the ostrich, and the only other struthious birds are in South America and Australasia.

The extraordinary number of families of reptiles and amphibians, particularly of snakes, common to the southern lands of the two hemispheres, is very cogent evidence for a former connection with Africa. This reptilian and amphibian fauna is mainly a tropical one and cannot be looked upon, therefore, as having come by way of the northern parts of the continents. It is also plainly indicated by the fossil shells and corals of the West Indies of Miocene age that there was a sea barrier between the northern and the southern parts of America in Tertiary times. Thus it seems not unreasonable to conclude that while there was a separating sea between South and North America in the Tertiary period, a land connection existed in the south between Patagonia and the Australian and Ethiopian regions.

* *Princeton University Report* vol. iv, p. 324.

Notwithstanding, however, the marked affinity between the present and past animals of South America and those of the Australian region, and between a portion of both the fauna and the flora of South America and the animals and plants of Africa and Madagascar, Dr. Russell Wallace has opposed with his powerful pen the former direct connection between America and either Australia or Africa. In his view, all the animals of the southern part of America are derived from the north, and the animals of Australia and South Africa are derived from northern migrants likewise, and so the present faunas of the southern extremities of both hemispheres have been derived from more northern centres of dispersal; that, in fact, earlier types migrated or were driven to the south of both the Old and New Worlds, and there continued while newer and higher types were developed in the older areas of origin. Thus he regards the marsupials, the edentates, and the struthious Rhea of South America as survivals equally with the marsupials of Australia, the few edentates of Africa and India, and the ostriches and emus of Africa and Australasia.

Wallace therefore only admits land connections between America and the Old World in the northern hemisphere, and following Huxley maintains the permanence of the great oceanic depressions of the globe. Since these views were published, however, the additional evidence from the Patagonian Tertiaries seems to compel an admission of former land connection with the Old World in the southern hemisphere.

The hypothesis of a mid-Atlantic continent uniting Europe and Africa with the West Indies and America has a fascination for many, and has been strongly advocated by authors who must command attention. The Atlantis of Plato's *Timæus* was a large island beyond the Pillars of Hercules, but the Atlantis of modern authors is greater, since it is a continent extending quite across the Atlantic Ocean even where it is widest and deepest. This would, it is contended, afford a direct passage for the terrestrial and coastal fauna and flora of the tropical and sub-tropical parts of the Old World to the West Indies and the American continent, and so explain the relations existing between the faunas and floras of the Mediterranean and West African areas, the Atlantic islands, and the tropical and sub-tropical parts of the New World.

This view has recently been advocated by such an eminent zoogeographer as Dr. Scharff, who cites in its support the distributional facts furnished by the Azores, the Canary

Islands, the Cape Verde Islands, Madeira, St. Helena, and Fernando de Noronha, all of which have seas of more than 1,000 fathoms depth separating them from continental land, and so have been considered oceanic islands.

The permanence of Ocean Basins, which the Atlantis hypothesis opposes, is an important subject, and has engaged the attention of very eminent men. Amongst those in favour of that permanence may be mentioned Huxley, Wallace, Sir Archibald Geikie, Asa Gray, and Professor Oliver, who based their conclusions on the higher specific gravity of the earth's crust below the oceans, the general absence of sedimentary rocks in oceanic islands, the absence of deep sea deposits in continents, and the agreement of plant and animal life and the present arrangement of land areas. In his Presidential Address to the Geological Society in 1890, Dr. Blanford examined these grounds in detail, and then expressed the opinion, "that whilst the general permanence of ocean basins and continental areas cannot be said to be established on anything like firm proof, the general evidence in favour of this view is very strong."

Amongst those who have favoured the opposite conclusion are Lyell, Darwin, Edward Forbes, Andrew Murray, Heer, Unger, Leidy, Hutton, Guppy, Newmayer, Von Ihering, Suess, Laparent, and Dr. Scharff. Although I have the utmost respect for the opinions of these authors, I must confess that I fail to find anything in geology or zoological distribution requiring such a complete change of the geography of the world as would be effected by continental land occupying areas where now are the deepest parts of the oceans. While recognizing the cogency of the before-mentioned arguments for the permanence of ocean basins, I will venture to add one more which I hope may contribute to give the "firm proof" that Dr. Blanford desired.

The former elevation of the floors of the abysmal depths of the oceans above the surface of the sea has been accepted, I think, in a large measure from the assumption of the globe having but a thin solid crust, which is vertically mobile and flexible. Thus by its flexibility wrinklings on a stupendous scale would follow an accommodation of the exterior to the shrinkage of a cooling interior, and so oceanic depressions and continental elevations would be found in different areas at different times. Such an amount of flexibility, indeed, has been assumed, that Croll ascribed the great northern depression following the Glacial Period to the weight of the glacial ice.

It is many years since I came to quite other conclusions. In 1894 and 1896 at the Oxford and Liverpool meetings of the British Association, and to the Geological Society in 1895, I showed, I think, conclusively that there had been no appreciable shrinkage of the whole globe, or, in other words, no mean radial variation since Cambrian times. The elevations and depressions that have since taken place I regard as due to expansion and contraction of the underlying solid masses mainly by increase and decrease of temperature, and that these regional secular movements did not affect the general rigidity of the planet, which might be practically solid throughout. The oceanic depressed areas and the continental elevated areas are, it seems to me, original features produced by the consolidation of the globe, the *consistantior status* of Lord Kelvin, when there was a very decided shrinkage, and are so far permanent that subsequent surface movements have never been sufficiently great to obliterate them, but only to modify their outlines.

The conversion of the central Atlantic into a land area would require an elevation of the sea bottom of over 27,000 feet, and seeing that as the temperature of the lower depths of oceanic waters is uniformly about 32° F., or the freezing point of fresh water, there is, in this vast body of cold water, a permanent cause of non-expansion of the underlying masses, and, consequently, it seems to me, that the ocean basins have never been obliterated by the elevation of their floors into land areas, and that, therefore, the Atlantis hypothesis is untenable.

On the other hand I cannot accept Wallace's conclusion that the only land connection from the Old World to America was at the north, for an amount of elevation such as can be readily admitted would give land bridges in the southern seas connecting the extremities of the southern continents that would allow of, I think, not only the migration of the fauna of those extremities, but also of animals whose usual habitats were of a more tropical character.

To account for the relations existing between the faunas and floras of the southern lands of both hemispheres, H. O. Forbes, in 1893, supposed an Antarctica that connected Australia, New Zealand, the Fiji and Mascarine islands with South Africa and South America, and in 1895, Hedley, before the Royal Society of New South Wales, suggested a somewhat narrow strip of land, perhaps, sometimes, broken into islands, with a mild climate, extending across the South Pole from Tasmania to Tierra del Fuego. Other authors have advocated modifications

of these views, and Ortman, the most recent, takes a view intermediate between those of Forbes and Hedley.

Oceanic depths have been found to be from 2,000 to 4,500 fathoms under vast areas, surrounded by lesser depths, under extensive areas also, extending to the shore lines of the continents. Elevations, therefore, of 12,000 feet would give a great extension of present land areas while leaving the ocean basins with depths of water ranging to 15,000 feet even if a general and equal uprise of the whole ocean floor had taken place, which is by no means probable.

Such an amount of elevation would, I think, suffice for zoogeographical requirements, since it would give land connections in the north that would furnish bridges for the temperate animals of European and Asiatic lands, and in the south it would give connections either complete or nearly so between Australian, African and American lands, that would serve for the migration of both the sub-tropical and the tropical animals of the eastern hemisphere.

Such an elevation would also be sufficient for the geographical and geological changes of Tertiary and Quaternary times, for it would give the uprise that laid bare the now submerged continental shelf, united continental and some called oceanic islands, to the mainland, and gave those extensions seawards of existing river-valleys that Professor Hull and Professor Spencer have, on several occasions, brought before the notice of this Institute. It would also, I may add, be amply sufficient to raise the lower northern mountains above the snow-line and so produce the geographical and climatal conditions of the Glacial Period, while in the Pacific area it would suffice to give Darwin's land on the submerged summits of which are now a thousand coral islands, and yet there would be no obliteration of the Atlantic, the Pacific or the Indian oceans.

I venture, therefore, to conclude that an elevation of 12,000 feet at one time or another in different areas during the Tertiary and Quaternary Periods, which we have seen, may be readily conceded, while not affecting the permanence of ocean basins, would yet be sufficient to allow of all the animal migrations necessary for the faunal development that living animals or fossils in America reveal.

Discussion.

Mr. David Howard, F.C.S.—This interesting paper suggests many questions some of which it is perhaps impossible to answer. It is curious to find types of animals which formerly existed in both the New and the Old World and have died out in the New. Can we be sure that the types now found have continuously existed in the New World, or may not some at any rate have become extinct and been reintroduced from the Old World.

The question of ancient continents uniting, Europe and America, or India and Africa is fascinating to dream of, but difficult to prove. Such an idea requires of course relative alterations of elevation; and it must be remembered that any great upheaval from the bottom of the sea unless counterbalanced by a corresponding depression elsewhere would greatly alter this sea level.

Mr. Rouse.—In his able and exhaustive paper Professor Lobley has identified no American species of terrestrial mammal with any species native to the Old World; but one may say that the caribou is not determined to be specifically distinct from the reindeer of Lapland, that the polar bear is found along the northern coasts of Asia as well as of America, and that in the preserve of bisons made at Winnipeg some years ago, those beasts were found, if memory serves me correctly, to yield fertile offspring with the domestic cow. If the last fact be true, the progenitors of the bison may have easily been brought over in the first immigration by the Indians who first passed from Kamschatka into Alaska across the ice; and as for the polar bear and the reindeer they both undoubtedly crossed over polar icefields from the Old to the New World; the bear, as it is, often drifting for hundreds of miles upon icebergs and having been found swimming eighty miles from any land and with no ice in sight (*Living Animals of the World*, p. 124). These, however, are all the species that America shares with the other continents; whereas, if we accept the Darwinian theory and suppose Atlantis to have sunk out of sight a few hundred years before Plato wrote of it, we should nevertheless expect very many of the species that had

crossed by way of Atlantis between Africa and America to have maintained their identity until now. Professor Lobley rightly argues against the theory of a former Atlantis on the ground of the enormous depth of the ocean between western Africa and America: and to this I would add that in the late Dr. Daniel Wilson's lecture quoted by me after Professor Hull's paper on the "Fauna of Islands," a parallel was drawn between Plato's statement and the idea that the early discoverers had of America; one Elizabethan writer even speaking of it as an island, and the first French Colonists thinking that the River St. Lawrence was a channel leading to China and so calling its first rapids Chute de la Chine—a name that they have borne ever since. Doubtless, said Doctor Wilson, the Carthaginian mariners who left their coins upon the Azores, did at one time penetrate to America, and on their return described it, but were not able to reach it any more; so that the story went abroad that a rich and beautiful country beyond the Pillars of Hercules had dropped out of sight into the depths of ocean.

Professor H. Langhorne Orchard (in the Chair).—Professor Logan Lobley never addresses us without giving us something valuable, something for thoughtful consideration. It is a great advantage, in matters geological, to have the subjects introduced by so careful, so patient, so sound, an investigator.

The interesting comparison of the fauna of the western hemisphere with the fauna of the eastern, shows that while some forms are common to both hemispheres, others are restricted to the one hemisphere or to the other. This leads to the conclusion that migration is not the only factor concerned in faunal arrangement, and that animal life has had origin in more than one locality.

On the much debated question of the Permanence of Ocean Basins, the reasoning in the paper has much force. We shall probably conclude with the learned author that "an elevation of 12,000 feet," (or thereabout), "at one time or another in different areas during the Tertiary and Quaternary Periods, . . . would be sufficient to allow of all the animal migrations necessary. . ."

Whether or not the mystery of Atlantis is to be solved, as has been suggested, by the prior discovery of America, is a matter in regard to which we do well to be patient.

The series of "horse-like animals" invites some comments. If the more recent forms were the progeny of the less recent, then, as

regards toe development or structure, the series would present differentiation *backwards*, which is incompatible with Evolution. The genus Equus is found in the Upper Siwalik beds, from which circumstance it appears that Equus existed in the Upper Miocene, in which case Equus existed before forms supposed by Evolutionists to be its ancestors. In the three "horse-like forms"—Mesohippus, Miohippus, Protohippus, each genus is less modified in some respect than its predecessor. This has been pointed out by Scott;* from which it results that the earlier forms resemble Equus more than they resemble their immediate successors in the chronological series, another fact incompatible with Evolution. It is worth remarking also that later horse-like forms are not invariably larger than those preceding them; for Epihippus† in the Upper Eocene, is much smaller than Protorohippus† found in the Middle Eocene. And, with regard to Phenacodus, if account be taken of the long period from Phenacodus to Equus, the time necessary to derive this form from a non-ungulate form is so enormous as to be altogether inadmissible.

Mr. W. Woods Smyth.—I am thankful to Professor Logan Lobley for his paper—for its immense and widely gathered information and for its interesting subject matter. I regret to have to show good reason for refusing to accept his closing views upon the earth—upon land and ocean areas. In these Professor Lobley follows Lord Kelvin's idea that the earth originally became consolidated from centre to surface—Kelvin's *constantior status*. At the Cambridge Meeting of the British Association, 1904, the venerable geologist the Rev. Osmond Fisher, submitted satisfactory calculations to show that the folding convolutions and contortions of the earth rendered Lord Kelvin's theory of a primeval solid earth an impossibility.

The Author briefly replied.

---

* *Transactions of the American Philosophical Society* (N.S.), 18, 1896, pp. 119, 120.

† These forms are in the American Museum Series.

ORDINARY GENERAL MEETING.

WAS HELD IN THE ROOMS OF THE INSTITUTE, ON MONDAY, APRIL 27TH, 1908.

LIEUT.-COLONEL MACKINLAY, IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed.

The following candidates were elected :—

ASSOCIATE.—Rev. T. Stanley Treanor, M.A. (Dub.).

LIBRARY ASSOCIATES.—The John Rylands' Library, Manchester ; The Royal Dublin Society Library, Dublin.

The following paper was then read :—

THE SHIA TURKS.

By Rev. G. E. WHITE, Dean of Anatolia College, Turkey.

MOHAMMEDANISM is sometimes praised by onlookers for presenting a united front in contrast with Christianity, which is rent into many sects more or less discordant with one another. The fact is, however, that one great seam runs through the Mohammedan world, not to speak now of minor factions, and their mutual antipathies are most intense where the two wings come into closest relation with each other. These parties are the Sunnite, which is reckoned orthodox by the doctors of Islam, and the Shiite, also called Alevi and Redhead, whose adherents are admittedly sectaries.

The Persians are known as a Shiite nation, and we hear that a few Arabs and Indians, many Albanians and others in European Turkey, the Nusariyeh in Syria, and scattered individuals and communities from the Cape of Good Hope to China belong to the same nonconformist faction. As the most authoritative expounders of the Mohammedan faith are Sunnite Arabs, so its most valiant defenders are the Sunnite Turks. Yet in the stronghold of Turkish power, the fair provinces of Asia Minor, about one-fourth of the people are not Mohammedan at all but Eastern Christians, and of the Mohammedan

population about one-fourth—some suppose one-third—are not Sunnite at all but are schismatic Shias. For the present this line of cleavage is kept very much out of sight, but circumstances might easily take such shape that this internal breach would come to the surface as a deadly wound.

To describe these Shia Turks is the object of the present address. My information is not drawn from the writings of others, but comes from personal observation and acquaintance during long residence in the country. One large element in the

The illustration is that of Piri Baba, Sheikh of the Bek Tashi Tekye, of Marsovan, Turkey, and his three children, with the author of the paper, the Rev. G. E. White, B.D.

heterogeneous population around my home is composed of Shias. I have slept in their houses, eaten at their tables, visited their shrines, and engaged in long conversations with their people, whether humble villagers or revered *hojas* and *dedes*.

The Shias are among the most simple, ignorant and despised of the people of Asia Minor. They are cunning, secretive, deceptive. They are reproached with having no "book." Jews are recognised as the people of the Tevrat or Law, Christians as people of the Injil or Gospel, and orthodox Mohammedans as

people of the Koran, while the poor Shias have no authoritative Scriptures corresponding. They prefer the name "Alevi" for themselves, which indicates their allegiance to the fourth Caliph: and are asserted by outsiders to revere Ali and his martyr sons Hassan and Husseyn far more than the Prophet himself. They ignore as far as possible the first three successors of Mohammeid and never give the names Abu Bekr, Omar or Othman to their sons. The deadly struggle between the house of Ali and their rivals, during the first generation after Mohammedanism was launched upon its career, must have produced a deeper and more lasting influence than students of history can easily realise. The victorious party accepted the Sunna, or traditional doctrine supplementary to the Koran, while the Alevis rejected it. The latter claim to be primitive and puritan Mohammedans, and hold the whole line of Caliphs since their hero Ali as usurpers and impostors. They profess allegiance to a line of Twelve Imams, of whom Ali was the foremost. In return for the name "Redhead," flung at them in contempt by their orthodox neighbours, they retort with the epithet "Yezidees," which they interpret to mean devil-worshippers, though originally the term may have come into use from the fact that Yezid was the Caliph under whom the last representatives of the house of Ali were slain. When a Shia Turk lays aside his habitual mask of secrecy he pours forth a terrific flood of denunciation and vituperation upon the devoted heads of his present masters. "Ah, in the next world we'll saddle them for our asses, and we'll ride them, and we'll ride them!"

Most of my Redhead acquaintance are an agricultural or pastoral people, living near to nature and in close sympathy with her changing moods and seasons. They do not intermarry with any other sect or race, whether Mohammedan or Christian, and reside, for the most part, in separate villages of their own people. They love the fertile plains and upland pastures of Anatolia, with its clear streams running among the hills, its wholesome climate, its abundance of nourishing food, and, over all, its sky of Mediterranean blue. The Shias probably represent the original inhabitants of the country with but little intermixture of foreign blood. They perpetuate many ideas and customs handed down by tradition from the centuries before the Christian era. Government officers give them no place in the civil administration, and socially, they are a class inferior and apart, but they render their full quota of recruits to the Turkish Army, and pay taxes with none to intercede in their behalf. An Armenian has perhaps a better chance of

raising a cry of remonstrance that will be heard than has his Redhead Turkish neighbour. Redheads lead the simple life, a life often very hard and coarse, but many of them seem to be quite clean, wholesome persons, men whom I am glad to count among my acquaintance. They claim the Mohammedan right of practising polygamy for those who can support more wives and households than one, but plural marriages are not common, and they disallow the right of divorce. They know little of commerce, and have little of luxury in their houses of stone or of sun-dried brick. The men, often assisted by the women in the fields, raise most of what appears on their tables, and the women, often assisted by the men, weave and sew and knit most of what they wear. But for a table grateful to a traveller, or lodging refreshing to a weary man, commend me to the patriarchal establishment of a well-to-do and hospitable Redhead Turkish bey, albeit I have sat at such a table on which was neither knife, nor fork nor spoon.

One is almost startled to recall how much of the life of these people is under religious prescription or prohibition, and then to form a picture of what their religion really is. Part of their faith and practice with regard to superhuman beings is evidently Mohammedanism, but part, varying with the locality and the individual, is pure paganism, some of which in historic origin antedates either Mohammedanism or Christianity. They regularly have no mosques, though in recent years the government has been compelling some villages to build them. The mosques often remain unopened, however, unless in the sacred month of Ramazan a preacher is sent to instruct an unresponsive congregation in correct Mohammedan form. I have been in a Shia village for days together without hearing the call to prayer more than once, and that one time it was given because there happened to be present then an orthodox believer. In the clear dawn of a summer morning a company of us were once mounting our horses for a journey, after having spent the night in a Shia village, when one of our number, an orthodox Mohammedan, was heard muttering that he had not yet said his prayers that morning. "What does the Almighty need of your prayers," said our host; "He knows what you are without your telling Him. It is the clean heart God wants, the clean heart." In general, Shias greatly dread the illwill of their Sunnite masters, and endeavour to observe the set forms as to prayer, fasting, and other worship with care enough to keep from becoming a public scandal, but secretly they hold to their own peculiar views with great tenacity. Strict Mohammedans

say, "We know that the followers of Ali are not true believers; if they confessed what they are, what we know them to be, we could not fellowship them; but since they deny to us their real beliefs and claim to be one with us, we do fellowship them." And that is good Mohammedan doctrine, the aim of which is not to *be* but to *seem*, to recognize not that which *is* but that which is *professed*.

More specifically, in their theology Shia Turks suppose that they believe in one God, eternal, immortal, invisible, the Creator, Lord and Judge of all men, but practically they pin their faith much more firmly to numberless intermediary and intercessory beings. God is thought of as a being very far away. The idea of the Ruler of the universe and that of the ideal earthly monarch must influence each other, and the Oriental conception of the ideal sovereign pictures a person of absolute power, above all law, seated on a lofty throne, from which he dispenses favours with a lavish hand, or stalking through his domain, scattering blessings here and there without regard to merit. Such a ruler is expected to be capricious in his administration. He cannot be much influenced by ordinary processes of law, but he is expected to pay quick attention to the requests of his personal favourites made in behalf of some third party. Near the person of the monarch there will undoubtedly be courtiers so influential that their requests cannot be rejected. If, then, a humble citizen of the kingdom can gain the intercession of an influential courtier, he will probably escape all penalty and secure all available good fortune without regard to the merits of his case. Shia worship, therefore, is in reality offered their patron saints, of which more after a few moments. Mohammedans never approach the Divine Being as a father, or endow him with the attribute of love. John sums up their sad condition in the words (First Epistle, ii, 23): "Whosoever denieth the Son, the same hath not the Father." Mohammedans worship God from motives of fear, or duty, or self-interest. The great Christian mainspring of action, love for a personal Master and Saviour, love for the Father as revealed in the Son, is lacking in their darkened lives.

Eastern people usually emphasize the sovereignty of God to such a degree as to become fatalists denying human free will, though this doctrine involves them in many practical difficulties, they cannot escape the entanglement. But if a man's conduct is all written in the stars before his birth, there is no adequate ground left for moral rewards, if he does well the merit is not

his and if he sins he is not to blame. There is consequently no adequate sense of sin or responsibility. Sin is little more than misfortune, and the act which elicits dire penalties might have been slighted over if the ruler had been looking somewhere else just then, or had happened to be in a different mood. Certainly there must be some atonement for sin, if only the guilty conscience could find the acceptable sacrifice, the mediator whose intercession cannot be refused. For conscience works, even though it has not its legitimate basis to work upon in an adequate sense of moral responsibility.

If a fatalistic creed minimizes moral responsibility, Shia belief in the transmigration of souls strikes at a true sense of personality. They say that God created man and entered into him with the human spirit. At death the spirit comes out. If the man has forgotten God, ignored worship, has been and done evil, used bad language, and so on through the category he may be reborn an animal, *he deserves to be.* On the contrary a noble animal, like a fine horse, may be the present abode of some good man. Shias proceed to confuse the personality of men whom they hold saints. They affirm that He who was revealed to Christians as Jesus was revealed to them as Ali. That is, the same person or principle appeared in two incarnations. One must not, therefore, give too much weight to their professions of reverence for Jesus and His Gospel or to their offering of prayers in His name.

Shias claim to be very near Christians, so near that less than the thickness of an onion skin separates the followers of Ali from those of the Nazarene. In one respect they show remarkable confidence in Christians. One of the regular social customs of Mohammedanism is the use of the veil, which every woman must wear in the presence of any men except the members of her own immediate family. This requirement means that no man can trust any woman, and no woman trusts any man. But Shia women, who are said to eat at table with, and not after, their husbands, do not wear the veil in the presence of Christian men, but meet them freely and with open faces. And Shias like Christians are said to make the sign of the cross on the top of every loaf of bread before it is baked.

This last custom is ofter urged, along with other indications, as proving that this peculiar people are apostate Christians in origin. The supposition is that their forefathers were Christians, who, in some time of agony when the crescent and the sword of Islam were in the ascendant, yielded a formal

assent to their conquerors' faith, while cherishing in secret some of their ancestral rites. It is very generally affirmed that they secretly observe a debased form of the Lord's Supper. Some Shias know and confess that their ancestors were of Christian faith, and certain names and idioms of speech furnish indubitable confirmatory evidence thereto. But Christian blood flows in the veins of many Turks, and personally, I am not convinced that the ceremony of eating and drinking, which is undoubtedly a part of their worship, is one in origin with the Supper instituted by our Lord. The Shia priests are a class of men called *dedes*, who dwell singly or in groups at shrines called *tekyes*. Each *tekye* has its own parish, which may consist of a considerable number of villages, and at some distance from the sacred centre. Once or twice a year, most regularly in the autumn, the *dedes* make a circuit of their parishes, and this is a great event for the villagers. Their most highly prized services are held on this occasion and with great secrecy. Guards are posted, sometimes in a triple line, around the village, around the house, and at the door of the building. The place of meeting is a common house; the time, always after nightfall. Eyewitnesses and participants in the worship say that a table is set with sacrificial or sacramental food and wine, of which the congregation partake. Then the *dede* preaches beautifully, inculcating the common virtues, teaching their peculiar observances, and emphasizing the common bonds that link all the communities together. Prayers are offered, in which every person present is remembered, and even every article of furniture in the room has its share. For instance, one person brings forward the lamp, a prayer appropriate to it is offered, and then the attendant sets it back on its shelf. Then a religious dance takes place, the men and the mature women present going through some form of motion in time together. Such performances would naturally be viewed as scandalous, or at best as very suspicious, in the East, and these gatherings are roundly denounced as indecent by sober-minded citizens. On these tours the *dedes* gather up abundant religious dues from their people, for they are regarded with great veneration, and they rule their willing congregations as with a rod of iron.

Peasant life in the Orient is rather sombre. Death is possible any day. An average of one sick person to every house of a village is not uncommon. Crop failure may bring famine any year; delayed or scanty rains mean drought and hunger; oppression by officials, a robber raid, war, accident, pestilence, disease among the cattle, may occur at any time

and the humble rustics feel unable to cope with the powers, natural or super-natural, that lie back of such calamities. Hence it is a question of constant and practical importance how to propitiate the unseen beings so as to retain their simple joys and escape their dreaded evils. For the solution of this problem the Shia puts his chief reliance in the saints who are his intercessors with God. These may be such persons as Ali, or Jesus, or any of the great prophets, but these renowned personages are beyond the acquaintance and reach of the ordinary villager. And so every village, as a rule, has its own shrine, frequently "a high place," and surrounded by a sacred grove, where there is a holy grave. The occupant of this grave, called an "*evliya*," was once a man, of great reputation for sanctity, and now, though dead, is regarded as lord of the region and the protector of his own people. He takes a lively interest in the affairs of his parish, and prayers presented by him to the Almighty cannot be lightly ignored or rejected.

Here is the heart of Shia worship. When a man fears a reverse in business, attains some object or earnest desire, or wishes to engage in special devotion, when a wife longs for a child, like Hannah, or when a mother yearns for a sick or absent son, when a community engages in the annual ceremony of praying for rain, or unites in some common petition or thanksgiving, recourse is taken to the village shrine and saint, or a journey is made to some spot of more renown further away. In the real crises of life Shias turn to their saints. And in this respect all the inhabitants of Asia Minor are much alike. Christians and Mohammedans appeal to the Supreme Being through the agency of their various mediators. Different sects have different saints, for the most part, but the principle of offering worship by means of intercessors is acted upon in general by all. How these gropings show the need for the intercessory work of Christ?

All down the centuries the more important praises and petitions of all Anatolian people have been accompanied by sacrifices, and Shias keep up the old custom with more assiduity than any others now. The building of a house or a boat, the escorting of a bride to her new home, the setting out on a pilgrimage, the inauguration of any important public enterprise or personal venture, is consecrated by the shedding of blood. The meat is eaten by the persons chiefly concerned or is shared by them with the poor. A cock is sometimes sent from a house where there is sickness to some other family, where it is eaten, and the people who participate in the sacrificial food become thereby intercessors for the welfare of their sick friend.

Or a larger animal may be distributed in parts to many houses, either to secure the prayers of those households or as a token of thanksgiving for some blessing already received. After a death it is the custom to furnish a table with what is called "soul food," either on the evening after the burial or some days later when the natural feelings of grief have somewhat spent themselves. Food is provided, in kinds and quantity according to the ability and piety of the house of mourning, a company of friends and neighbours is gathered, not forgetting the poor, prayers may be said by some *hoja*; but in any case all the persons present are regarded as exerting their influence with the righteous judge in behalf of the friend who has passed into the realm of eternal rewards. Last spring the rains were belated and scanty, and from almost all the villages of Anatolia choice animals, sheep, goats and cattle, were provided at community expense, slain with simple sacrificial rites at the village shrines, and the flesh was then eaten by the villagers and such other people as happened to be present at the time, with the accompaniment of earnest supplications for God's mercy in the gift of fertilizing showers.

A Shia Turk believes quite as sincerely in evil spirits as in saints, and he lives in mortal terror of being bewitched by the evil eye. Lunacy, epilepsy, dumbness and other maladies are attributed to possession by *jinns*, or unclean spirits. Some persons claim to have witnessed their gathering by the thousand in a veritable pandemonium. The claim of being skilful exorcists is made by some, the standard remedy being "reading" from some sacred book over the afflicted person. Sometimes the person possessed is taken to some sanctuary and left there in confinement for a longer or shorter period, that the influence of the holy place may avail to rid him from the dominion of beings unholy. One method of treating the sick is to ask the person whether he "sees" anything; if he does, probably he is under the influence of evil spirits; if he does not "see" anything, probably he is suffering from an ordinary physical ailment, and treatment is given according to this diagnosis. Fear of the evil eye, whether the dreaded glance proceed from some living man or dead ghost, seems to be connected with thoughts about evil spirits. The eye of a stranger is not liked. Blue is supposed to be a dangerous colour, and blue-eyed children are not acceptable. Blue beads are a general prophylactic against harm from an evil eye as absorbing and neutralising the baleful glance. Amulets, charms, bits of writing from sacred volumes done up in leather and other devices, are used to ward off harm

from those powers, seen or unseen, that are always so ready to work unexpected harm. No child or tender plant or animal should be praised without the utterance of some charm, like the words "wonder of God," to forefend the danger of a spell being thrown over it by some baleful being jealous of the praise. Perhaps the very air of the Orient stimulates the growth of such notions. I have been entertained in his home by an Englishman long resident in the Orient, a man of classic learning, concerning whose beautiful baby boy I uttered a few words of appreciation. The father immediately spoke the Turkish charm designed to avert the evil eye, and added that in his household they had often seen some favourite plant or pet animal bewitched by the expression of praise, and destroyed, unless the preventive charm was also used.

Fasting is prescribed by all Eastern rules for religious conduct, but our Shia friends render only eye-service during the month of Ramazan, when the orthodox Mohammedan world spends the days in fasting and the nights in feasting. Shias keep ten or twelve days, the more devout even thirty days, before the tenth of the month Mouharrem, especially refraining during that period from the use of water. They say that Ali or one of his sons was put to death by being deprived of water, and so they drink none in memory of his suffering. They supply the needs of the body, however, by the use of milk, soup, and drinks of water mixed with fruit juices. When the tenth of Mouharrem comes there are sad scenes in the Persian part of the Shia world. White-shirted men form in processions that march through the streets, beating themselves over the head and shoulders with whips, until their persons and their garments are clotted with blood, while they wail "Hassan, Husseyn, Hassan, Husseyn," in their annual lament for the untimely death of their favourites. In Turkey such Passion Plays are not seen; on the contrary your good Alevi, having denied the flesh to a perceptible degree and mourned with real regret for the heroes of his faith, feels in a satisfied mood with himself and with things generally. They make at this season a soup coloured red, and send portions from house to house, for as much as three days in succession. This soup is called Ashoura, and even Christians and other outsiders are welcomed to a share in it if circumstances admit. It is regarded as sacrificial, and it brings the greatest festival of all the year to Shias. The Hadji Bek Tashi tekye in this city, a Shia foundation, serves red soup at Ashoura to all comers, and I partook of it a year or two ago, in response to the invitation

of my friend the sheikh. He told me that they had made up about eight bushels of cracked wheat, 250 pounds of grape syrup, with walnuts, corn, and several other ingredients into the soup, and had served it with "health-giving bread"—health-giving because provided at a sacred shrine and season—and hundreds of people, rich and poor, had partaken of the bounty. Such a meal is undoubtedly viewed as a sort of sacrament.

I believe the main features of Shia religion have now been touched upon, except the matter of pilgrimage. Saints or sacred men, sacred seasons, and sacred ordinances require sacred places to complete the requirements, and one will be naturally expected to repair to such places as he has opportunity, and to acquire merit by doing so. The great resort of Shia pilgrims is Kerbela near the Persian frontier, to which corpses are brought for burial in incredible numbers. From most of Asia Minor this point is too distant, and the Hadji Bek Tashi tekye not far from Angora is the religious centre for pilgrims and for all the interests of Shia Turks. The chief Sheikh resident there is believed by some to be a veritable descendant of the house of Ali. He administers vast estates and disposes of large revenues. Some time ago the central government at Constantinople demanded the deeds of the Shia endowments, but their Sheikh furnished copies of his deeds, retaining the originals, and sent word out to all the Shia Turks to be ready for an insurrection, and the deeds never passed out of their owners' possession. Redheads who can do so aim to go on a pilgrimage to this their great centre, especially to eat red soup there at Ashoura, the tenth of Mouharrem. At that time there must be a gathering of the clans and a series of ceremonies that would be well worth a considerable effort to witness. Of the twelve orders of Dervishes recognised in this part of the world there are two of outstanding rank, namely, the Rufa'i, to which the Sultan himself is said to belong, and the Bek Tashi, and these last are a Shia order.

Local shrines are the resort of pilgrims, frequently when special need impels to special worship. From beside the grave of a saint earth is carried to the fields to prevent mice and other pests from harming the crops. Some of the same earth mixed with water is given the sick to drink, or is smeared upon the body, and children who are in any way deficient are carried three times around the grave, that they may draw healing virtue from its occupant. Certain shrines have an annual celebration, when people may assemble to the number of thousands to sacrifice, give thanks and pray.

A few minor points may be added. Shias do not require celibacy of even their holiest *sheikhs* and *dedes*, but if a man voluntarily chooses a celibate life they regard him with additional veneration. Contrary to regular Mohammedan usage they allow the use of wine, though they claim never to use enough to fuddle the God-given reasoning faculty. I fear, however, that many of them drink till they are much the worse for liquor. I said they held by twelve Imams; they look for a thirteenth yet to come, and it is perfectly possible that at any day some *Mahdi*, a Guide, may arise, whose appearance would shake the whole Shia world. One village not far away is said to have some sort of fire worship, perhaps a relic of Persian customs, but as yet no details have been given me.

The writer can never forget that he is with all his heart a Christian missionary, and while college work with large numbers of young men is his chief vocation, a missionary avocation at least may allow one to cultivate some friendly relations with the poor Shias. It is hard to acquire or retain any influence over them. They are recognised as Mohammedans, and the whole power of the Turkish Church and State is exercised to prevent anyone from avowing himself a Christian. They read almost nothing, and so the Scriptures have no opportunity to take hold, while their peculiar ideas of fate, pantheism and the transmigration of souls make it difficult for them to grasp Christian doctrine, even that concerning the person of Christ. They have not education enough to make them appreciate missionary schools. The medical missionary they can understand, and they seek our hospitals in large numbers. There they see and appreciate applied Christianity. Some of them say they never knew till sickness drove them to the hospital that there could be a place without bad language, hard feeling, harsh conduct, quarrelling, and similar dark concomitants of life. For all their efforts to win divine favour, to escape from the burden of sin, to face the future life without fear, they find no real satisfaction, no peace of heart. Some day, in some manner, they will come to understand the meaning of the life and work and teaching of Christ, and then,—would that I might be there to see!

Discussion.

The Chairman.—The fact, stated by the author of the paper before us, that both Christians and Mohammedans alike in Asia Minor appeal to various mediators reminds us how frequently the remains of old pagan religions survive. The Mohammedanism adopted by the Shias in the country we are considering appears to be somewhat superficial; this difference from their co-religionists in India may perhaps be explained by the fact that some Anatolian Mohammedans are descended from nominal Christians, and the rest from pagans who differed from the old heathen of India.

A book has lately been written containing articles by several missionaries giving accounts of Mohammedans in various parts of the world; these writers make it evident that considerable differences exist—for instance, divorce is not by any means equally prevalent in all Mohammedan countries.

Mr. Henry Carus-Wilson.—I should like to put a question in the hope that there may be present someone who could give the answer. I observe that the writer of this paper only alluded in one place to the doctrine of "merit" as influencing the actions of the Shia Turks.

A study of the great Book Religions of the East shows that the doctrine of accumulated "merit," under the symbol of "the Scales," acts as a mainspring in the everyday life of the Mohammedan, just as it does in the case of the Hindu, the Confucianist, and the Buddhist.

The orthodox Mohammedan believes that he is attended through life by two recording angels, who keep an account of all his deeds, good and evil. For every good deed the good angel records five good marks in his book; but for every bad action the evil angel records only one bad mark in his book. Thus a man can, for instance, steal five dollars, and be quits with his conscience by paying back only one. The books, which are posted every day,

will be taken at the day of judgment to the weighing-scales, an enormous balance held by the Arch-Angel Gabriel, and those containing the good deeds put into one scale, called "Light," and the bad deeds into the other called "Darkness."

When all this is done, if there should remain a single grain to the good on the "credit" side, God in His mercy will let the man into heaven; but if the balance be the other way he must go to hell, unless God has mercy on him, or the prophets or saints specially intercede for him.

With such a belief as this it is natural that the storage of "Merit" should become the Mohammedan's chief consideration in life. The recognised methods of acquiring "Merit" are five, viz.: by prayers, by fasting, by almsgiving, by reciting the Kalima, or confession of faith, and by Hajj, *i.e.*, making pilgrimage to the holy places, of which the chief is Mecca. These five meritorious acts are called "the Pillars of Religion." The "Merit" acquired by these means is thus summed up:—"Prayer carries us half-way to God, fasting brings us to the door of His palace, and alms procure us admission." There are, besides, many other methods of acquiring "Merit."

This doctrine of self-justification is of course diametrically opposed to the Christian doctrine of justification by faith.

It would be interesting to know whether the Shia Turk practises this system of accumulating "Merit" to the same extent as does the orthodox Mohammedan.

Professor Langhorne Orchard.—The apparent divergence (on one or two points) of the last speaker from the author of the paper may, I think, be accounted for by the fact that the paper concerns itself with the Shia *Turks* only, not with the Shias generally.

That their religion is a corrupted form of Christianity seems shown by such features as their use of the sign of the Cross, their observance of what is held to represent the Lord's Supper, and their great reverence for the Lord Jesus Himself. These circumstances, taken together, have a cumulative force.

By the Shia intercessory system we are reminded that holiness and sin cannot blend; hence, for communion between God and man, there must be an intercessor, a daysman. We are also reminded that, as man departs further from God, he multiplies the number of intercessors.

We shall all join in thanking the author for an interesting paper.

The thanks of the Meeting were then accorded to the author for his interesting paper, and the Chairman stated that the Secretary, owing to illness, was unable to be present, greatly to his regret, and desired to join in the expression of gratitude for the paper of Mr. White.

ORDINARY MEETING.*

DAVID HOWARD, ESQ., V.P., IN THE CHAIR.

The following candidates were elected :

ASSOCIATES.—W. R. Preston, Esq., 37, Gloucester Place, W. Harold Peirce, Esq., Philadelphia, U.S.A.

The following lecture was delivered :

ON THE EVIDENCE OF MALAY, JAVANESE, ARABIAN AND PERSIAN ADMIXTURE IN THE INCA OR KESHUA LANGUAGE OF PERU, AMONGST THE AYMARA LANGUAGE OF THE PEASANT CLASS. By F. W. CHRISTIAN, Esq., B.A.

OVER twenty years ago, whilst a schoolboy at Eton, I read with deep interest those two splendid books, Prescott's *Conquest of Mexico*, and *The Conquest of Peru*. It fired me with a most ardent ambition to explore that strange and picturesque domain of the history of Pre-Columbian man in America, and if possible to trace the migrations of Asiatic Columbuses from the Pacific side, and at the same time to endeavour to throw some light upon the settling of the little dots of lands scattered on the broad bosom of the great *Hai-Nan*, as the Chinese call the vast South Sea.

How the study and patient labour of the best years of my life has succeeded, this evening's lecture may in some sort set forth. I ask for a patient consideration of the evidences bit by bit, upon which is built up the theory of an Asiatic origin of the dynasty of the Incas which the Spaniards found nearly four hundred years ago established in the upper and lower valleys of Peru and along the coast-line facing Asia, from Quito or Ecuador to the desert of Atacama and the river Maule on the Chilian border.

* Monday, May 18th, 1908.

On coming of age, and leaving Oxford, I took the earliest opportunity of visiting Australia and New Zealand, where I became a corresponding member of the Polynesian Society, and at once armed myself with the Polynesian Liddell and Scott's Lexicon, *The Comparative Maori Dictionary*, in the pages of which by the labours of my friend and fellow-worker, Mr. E. Tregear, of Wellington, legion-like hosts of closely-related words stand side by side in serried ranks.

To make sure of my foundation I plunged with all speed into the study of these Polynesian dialects, beginning with the Samoan, which with all its vowel-sweetness deserves to be called the Italian of the South Seas.

Thence, by an easy transition, I passed to the Maori of New Zealand, the soft Tahitian, the queer Paumotan, the fearfully abraded and moribund dialect of the Marquesas, and the quaint diphthong-haunted language of the Caroline Islands and other rugged and harsh sounding tongues of Micronesia; the half-way houses between that vast busy hive of population the Malay Archipelago, and the further islands of the Pacific lying under the sunrise. The two last of these South Sea languages that I succeeded in conquering, tabulating, bringing into the domain of Comparative Philology, and forcing to yield up some of their secrets, were (1) the dialect of the Gilbert or Line Islands, and (2) that of Rarotonga, an island in the newly-annexed Cook or Harvey Group which Lord Ranfurly, then Governor of New Zealand, at the earnest desire of the natives and at the urgent representation of myself and other travellers and students, has now brought safely under the ægis of the Union Jack.

There I have taken many important key-words from these languages and have compared them with their equivalents in the two principal languages of Peru, the Inca,* Keshua or language of

* Before I go any further I must explain the terms *Inca*, *Runa*, *Runa-Simi*, *Keshua* and *Aymara*. The word *Inca* means a Prince of the Blood Royal or reigning house and is cognate with Javanese *unka*, a chief. *Runa* is the collective name of the upper class of the Peruvian nation, the *men* or *warriors*; it is cognate with the Mortlock word, *Ro*, *Ron*, a man, and with the Hindu *Dron*, which means a *warrior*. *Simi* means *mouth*, also speech, *dialect*, and is the Malay *Simut*, *Sumut*, the mouth, and possibly is akin to the Persian *Sima*, face. *Keshua* = of noble birth, princely descent. Arabic, *Khass*. Polynesian, *Kese*, . *Ese*, wonderful, extraordinary. Japanese *Kassi*, *Kesi*, polite, elegant, beautiful. *Aymara* is the Arabic *Aima-dar*, a man who holds *Aima-land*, a feoffee vassal like the peasantry of India, Java and Hawaii, who hold lands like William the Conqueror's tenant farmer Vavasour by the feudal system of tenure under military service and public works.

the King and Nobles and the language of the Aymara, the peasant class, or inhabitants of the upper villages, which Dr. Middendorf of Leipzig has laboriously, and with true German industry and patience, tabulated in his two great works the Grammar and Dictionary of (1) the *Runa-Simi* or *Keshua-Sprache*, and (2) of the *Aymara-Sprache* or language of the Aymara or peasantry, German and Peruvian key-words together side by side. I will not delay you very long upon the subject of these island languages, except to point out some few curious facts, which I have come upon in my studies, which it will be useful for us to keep clearly in mind as clues to guide our steps as we search carefully through the great labyrinth of half-forgotten traditions; as we elbow our way through the Babel-clash (charivari) of unfamiliar dialects; as we follow the faint and dim outline which I shall endeavour to trace; pricking out our way like cautious navigators in the philological chart, tracing these half-forgotten migrations of Asiatic Columbuses across the great waste of waters.

(1) The eastern Polynesian tongues, of which the Maori, the Rarotongan, the Tahitian and the Manjarivan are types, show a certain admixture of the maritime Arab and the Persian, probably from Arab *gharabs* or trading vessels,* from Bassora, and of the barques of Parsee merchants from Bombay, who working their way southwards in their extensive pearling operations on the coast of Western Australia, blundered upon the great south passage, and forestalled by hundreds of years the discovery of Tasmania or Van Diemen's Land and New Zealand by Abel Tasman and his stalwart Dutchmen from Java. Some of these vessels must have had live stock on board. I give as an example of this:—

Take the Tahitian word *Mamoe*, a sheep.

It is a worn-down form of the Arabic *Mamawesh*, plural of *Mawesh*, a flock or herd, which has the generic meaning of quadrupeds, live stock in general. This is the first thread in the fabric.

(2) But be it remarked: The main body of the key-words in these languages I find about three-fifths consists of Hindu-Malay roots, the result, I feel certain, of a very large body of emigrants from Java, the Southern Philippines and the Moluccas coming by way of the Carolines, the Hawaii, and Tahiti. Presently we shall trace this great migration of which we

* Compare *'Arawa*, the Maori name of one of the great canoes of the migration.

have very full and explicit traditions, exceedingly well preserved by the Maori of New Zealand. This migration gave the Carolines and Samoans their aristocracy or ruling class, just as the Norman invasion laid the foundation of England's ancient nobility. This is the second and most substantial thread in the fabric. To borrow a figure from the Inca *Quipus* or Calculating Cord, as Carlyle calls it, a *Quipo thrum*. Imagine a parti-coloured cord or cable twisted up of different threads, one of hemp, one of cotton, one of silk, a fourth of coir-fibre, and you will have an idea of the fabric of a South Sea or Peruvian language. Comparative philology untwists them one by one.

(3) Other threads in the fabric of South Sea speech are Aino Eskimo, Innuit, and possibly the Hydah of Vancouver. These are the early and primitive threads. These race-influences have been so covered up by the later migrations, and so overshadowed by the bolder and newer figures in the pattern, if I may call it so, that they need not enter much into our calculations to-night. Anyhow, nothing but barbarism could have come by this route to America.

(4) Then there are some few words in the Caroline and Gilbert Islands, and a fewer still in Rarotongan that have evidently come from the wrecked crews of Japanese, Siamese, and Chinese junks.*

I give a quotation from Preface of Book entitled *A Javanese Columbus or the First of the Incas.*

"In A.D. 1024 Mahomet of Ghisni made the fifth of his destructive invasions of Hindustan, and plundered the great Temple of the Moon Somnauth in S. Gujerat, obtaining an enormous booty of jewels."

This was the commencement of a succession of determined Arab inroads by land and sea throughout the East, and extending from India, first to Sumatra, then to the neighbouring island of Java, itself a colony from Gujerat, and a mighty centre of Hindu civilisation. The tide of Mohammedan invasion swept through the Malay Archipelago right up to the Philippines in the north and to the Moluccas on the east, where the great gateway of Gilolo opens

---

* The word for wrestling in E. Polynesia, *Kukumi* or *Kumi*, which is pure Japanese, *Kumi*.

These stray emigrants, if they reached the American coast at all, would much more likely have struck the coast much higher up, in British Columbia, California and Central America. So we may eliminate the odd threads in the fabric from our consideration as they do not affect to any great degree the history of the South Sea Islanders, or that of the Incas and their civilisation.

out upon the Pacific main. It was this growing pressure from behind, which forced bands of Malays of varying degrees of civilisation eastward and still further eastward from Java and Celebes, Bourn and the South Philippines, Timor and the Moluccas, to launch out in search of new homes upon the trackless deep. In 1475 the Hindu Empire of Java, after lasting about a thousand years, was finally overthrown at the great battle of Mataram in one of the western provinces of the island.

The scene where the events of the story of the adventurous Hindu-Malay Columbus commences is laid in Middle and Western Java about half way between these two notable historical events, the sacking of Somnauth by Mahomet of Ghizni and the battle of Mataram, the Javanese Senlac or Hastings, whilst the cloud of Mohammedan invasion was beginning to lower darkly and menacingly over Northern Java; where the Arabs, taking advantage of civil war and tribal dissension in the Sunda provinces of the north, had already raised the green banner and the Crescent, and the cry *The Koran and Peace, or the Sword of War!* About this time King John was wrangling with his barons, and the foundation of our British Parliament was being laid at Runnymede. Spain, rising like a Phœnix out of her ashes from under the heel of her Moorish conquerors, had just broken the Moslem yoke of the Almohades at the great battle of Tolosa, where, on that memorable midsummer day of 1212, the combined forces of Castile, Leon, Navarre, Aragon, and Portugal inflicted one of the most terrible defeats ever suffered by the Crescent at the hands of the Warriors of the Cross;—rich earnest of future bloodstained laurels yet to be won in harmless Holland, in savage Mexico, and in peaceful Peru under her mild Inca rulers, whose dynasty was as yet in the moulding and the modelling, as wax in the hand of the Almighty, whose founder was soon to spread sail and speed across the blue Pacific, a Javanese Columbus, inspired by the voice of a seer, by the counsels of brave adventurous warriors, piloted by God's messengers, the birds in their migration, guided by the hand of Heaven.

The south-west group of Polynesian tongues including Samoa, Fiji, and Tonga, has drawn a large proportion of words from Malagasy-Malay sea-rivers from the south, and of Javanese-Philippine Malay from the north, with a touch of Arab corsair admixture.

A careful examination of the chief language of Samoa, stamps it as partly Javanese-Malay* in origin, and therefore of Aryan type and partly Arabic and Persian.

---

* The Fijian aristocracy was Javanese-Malay in origin. *Cf. Ratu*, a prince, *Rani*, a queen. Javanese *Ratu*, a chief; Sanskrit, *Rani*, a queen.

As an example of the first we select:

Of Samoa. *Tofonga*, the face or countenance of the king or a great chief.

Of the second:

Sanskrit *Bhong*, the brow.

Suafa, the title of a chief.

Sani, a local law or custom.

Arabic *Sharaf*: *Shurafa*, nobility.

Arabic, *Sunni*, id.

Of the third:

Cf. Samoan *So'iso'i*, the smiles or laughter of a chief.

Persian *Shokhi*, jocund, humorous, a chief cheerful, mirthful.

Now we have got over some of the stepping-stones, and have made out a pretty good case.

(1) The Javanese-Malay migration from the north to Hawaii, in the extreme north, to Fiji and Samoa in the south-west, to Tahiti in the east and Rarotonga in the south-east.

(2) Malagasy-Malay in Fiji, Tonga and Samoa.

(3) Traces of Arab and Persian admixture in Eastern Polynesia.

Is there any other possible element which we have left unconsidered?

I think there are two others, or possibly three:—

The Ethiopian or Cushite from Abyssinia.

The Sabœan from Arabia Felix or South Arabia, and

The Babylonian from the Persian Gulf.

These do not much affect the main body of our argument, *i.e.*, The Indo-Malayan origin of the Inca dynasty, whom the Spaniards found reigning in Peru. Doubtless bodies of colonists of these three types entered the Pacific, and even got across to Peru. I should attribute the giant statues of Easter Island, and the Pre-Incarial ruins of *Tiu-Huanacu* in Bolivia to some of these. Then I should be inclined to say that, much later, Arabs and Persians reached Peru by way of Tahiti, with crews partly Polynesian and possibly with native pilots, and built on the foundations which the early Cushites or early Sabœans had raised. Then, I think, came the much more recent third great migration of Indo-Malays from Java, by way of Hawaii and Tahiti, about the time of King John, *i.e.*, 1230, and entered into their labours, founding the Inca dynasty which the Spaniards found in Peru, about three hundred and forty years later.

The first Inca, *Manco Kapak*, was probably a Javanese rajah, who in fear of the growing tide of Mohammedan invasion, got together a great fleet and army, and with other chiefs, perhaps from Borneo, Celebes, the Philippines and the Moluccas, set sail across the ocean to found a new kingdom. The line of migration traced to such a fleet sailing out of Gilolo Straits, with the north tradewind behind it, following the eastward equatorial current would touch at the following places:—

First, the Pelews, then Yap and Palawat; then Ponape and the Mortlocks; then the Marshall Islands; then Hawaii; then Tahiti. From Tahiti such a tide of migration might easily flow into two branches. One going upwards to the Paumotus and the Marquesas, [the land of *Hiva* or *Iva*, which looks very much like a colony of *Siva* worshippers], and the other southwards to Samoa, Rarotonga and New Zealand. I think the point at which they struck Tahiti on the voyage down from Hawaii [*Hawa-eiki* or little *Java*] was Port Phaethon on the Isthmus of Taravon, a splendid harbour lying at the mouth of the *Tau-Tira* River.

Now what does the name *Tau-Tira* mean? Much history may lurk behind a little geographical name. It means *The River of the Forest of Masts*, just like the Thames at Limehouse. So you see in your mind's eye, limned as clear as by the flashlight on the camera-plate, the stirring scene, a fleet of Javanese prahus and galleys, filling the river mouth, like the fleet of Edward and the Duke of Gloucester at Humbermouth, bent on conquest. The chiefs in their splendid armour, their silken scarves, and many coloured Malay kilts and parti-coloured trews, like Highlanders on their native heath, their gold-studded belts carrying an armoury of Malay krceses and daggers, and their retinue of spear-men, archers, slingers, and cross-bowmen.

What Tahitian legend have we to fill up the background? The natives of the Isthmus state that the great warrior tribe of the district were called *Tevas*, and that their tribal song was:—

Teva te Ua, Teva te Matai,
Teva te Mamari, Teva te Ahu-rai.*
Teva the Rain, Teva the Wind,
Teva the Mamari, Teva the Holy Shrine.

---

* Can these refer to the names of four great vessels? In Maori legend *Mamari* is the name of a famous big canoe of an early migration. It is a pure Sanskrit name, *Marmari*, the white pine. Similarly in the old Maori legends they say that the big canoes were built of the *Totara* tree, that is the *Deodara*, the deodar, cedar, or red pine.

Next we will ask what does the name *Teva* mean? Well, in the mouth of a Javanese mariner the word would appear as *Deva* or *Devak*, and would denote a Brahmin or high-class Hindoo, also a man of the *Kayath* class, the son of a Kshatriya father and a Suddra mother, *i.e.*, of a patrician father and plebian mother. Just such a term might well be applied to the descendants of Javanese chiefs who married Tahitian women. So now we have established one of our stepping-stones pretty fairly.

Someone may say—"Are there any evidences of Javanese land-laws or institutions, and of Hindu speech in Hawaii?" I state with confidence, *yes, there are*. Which will prove beyond doubt the track of this migration.

(Pelew, *Robak*, a chief. Hawaiian, *Lopa*, a farmer or vavasour. Sanskrit, *Ropak*, a planter. *Ropa-na*, to plant, till. *Aka*, the eye. Sht, *Ak*. *Manihini*. *Man-Hindi*.)

Before I go any further I must state that pure Malay names stud the map right up to Tahiti.

In the Pelews we find *Ngarut*. Javanese *Garut*, an important town and district in Northern Java.

In the East Carolines we find in Ponape the island and district of *Chokack* or *Jokack*, Javanese *Djokja*, the islets *Mutok* and *Paniau*. (Javanese *Muntok* and *Paniau*.)*

In the Marshall Islands we find the island *Majura*, of Javanese *Madura*, the island that shuts in Surabaya harbour, the Aulis from which Manco, the mediæval Javanese Agamemnon, set forth on his Polynesian *Iliad*, or rather *Odyssey*. In Hawaii we have the island names Kaunai and Molokai answering to the Molucca-Malay *Tawai o Morotai*. There is a large district called *Beru* in south-west Borneo, and an island called *Peru* in the Gilbert Group, half-way across to the land of the Inca, the Llama and the Alpaca. And here is a curious fact, explain it away who can. The two first key-words I found showing the Malay element in Peruvian were the words: Malay—*Fulu*, *Phuru*, a feather Inca. *Phuru*, and the Malay *Mangko*, a pottery bowl. Gilbert Islands, *Mangko*. Peruvian, *Mangka*: *Manka*, etc.†

The key was applied. The rusty wards turned slowly in the

* Both the chief's language and common language or Penape is full of Javanese words (*Kumikam*, a king's beard, Javanese *Kumis*, *Alich* a subject's beard, Javanese *Alis*).

† The above passage is somewhat obscure; but as the author was changing his address it was found impossible to communicate with him, and the Editor is obliged to leave it as it stands.

lock. The door now stands half open, ready for the student of Sanskrit, the Dutch civil servant with his knowledge of various local Javanese dialects, the Arabic and Persian specialist, to apply his shoulder, fling wide the gate of the treasure chamber, enter boldly in and gather a rich harvest of philological spoils. Cushites and Sabæans laboured, Carib Indians bore their yoke, Arab and Persian invader came over the seas, then Java-Malay sea-rovers, led by the hand of heaven, passed also over the great Pacific, and entered into their labours. Prosperity was too much for the Inca kings. For a while they prospered. Then they fell into idolatry like those old heathens of whom St. Paul wrote in the flashing and trenchant prose of the great epistle to the Romans,

"Because, when they knew God they glorified Him not as God, neither were thankful."*

* They worshipped Him indeed as *Pacha-Kamak* the *Creator of the World*, and built a mighty temple in His honour, the ruins of which still stand. But they turned to the Carib *Supai* or devil-worship and to the *Konopas* or idols of the early Cushite folk, and to the superstitious Brahministic worship of the *Huakas*, *Vakas*, or sacred animals, places and objects.

LIST OF THE

VICE-PATRONS, MEMBERS, ASSOCIATES,

&c.

VICE-PATRON.

A. McARTHUR, ESQ., D.L., J.P.

*** The Qualification of a Vice-Patron is a Contribution of not less than Sixty Guineas to the Funds of the Institute.

COUNCIL AND OFFICERS.

President.

THE RIGHT HONOURABLE THE EARL OF HALSBURY, D.C.L., F.R.S.

Vice-Presidents.

SIR T. FOWELL BUXTON, BART., K.C.M.G.
W. H. HUDLESTON, ESQ., F.R.S., *Past Pres. of Geological Society.*
ALEXANDER McARTHUR, ESQ., D.L., J.P.
DAVID HOWARD, ESQ., D.L., F.C.S., F.I.C., *f.c.* (*Trustee*).
LORD STRATHCONA AND MOUNT ROYAL, G.C.M.G., LL.D.
LIEUT.-GEN. SIR H. L. GEARY, R.A., K.C.B.
PROFESSOR EDWARD HULL, M.A., LL.D., F.R.S., F.G.S.

Honorary Correspondents.

SIR DAVID GILL, K.C.B., LL.D., F.R.S.
PROF. A. AGASSIZ, D.C.L., F.R.S.
PROF. MASPERO (*Paris*).
PROF. E. NAVILLE (*Geneva*).
PROF. A. H. SAYCE, D.D., LL.D.
PROF. WARREN UPHAM, D.Sc.
HIS EXCELLENCY HERR FRIDTJOF NANSEN, D.Sc.

Honorary Auditors.

J. ALLEN, ESQ.
LIEUT.-COL. MACKINLAY, LATE R.A.

Honorary Treasurer.

EDWARD S. M. PEROWNE, ESQ., F.S.A.

Secretary and Editor of the Journal.

PROFESSOR EDWARD HULL, M.A., LL.D., F.R.S.

Council.

(*In Order of Election.*)

REV. DR. F. W. TREMLETT, D.D., D.C.L., PH.D.
VERY REV. H. WACE, D.D., *Dean of Canterbury* (*Trustee*).
REV. CHANCELLOR J. J. LIAS, M.A.
REV. CANON R. B. GIRDLESTONE, M.A.
THEO. G. PINCHES, ESQ., LL.D., M.R.A.S.
VEN. ARCHDEACON W. M. SINCLAIR, M.A., D.D.
COMMANDER G. P. HEATH, R.N.
REV. G. F. WHIDBORNE, M.A., F.G.S., F.R.G.S.
EDWARD STANLEY M. PEROWNE, ESQ., F.S.A.
MARTIN LUTHER ROUSE, ESQ., B.L.
REV. JOHN TUCKWELL, M.R.A.S.
LIEUT.-COLONEL GEORGE MACKINLAY.
GENERAL J. G. HALLIDAY.
COLONEL T. HOLBEIN HENDLEY, C.I.E.
ARTHUR W. SUTTON, ESQ., J.P., F.L.S.
REV. PREBENDARY H. E. FOX, M.A.
PROFESSOR H. LANGHORNE ORCHARD, M.A., B.Sc.
RT. REV. BISHOP J. E. C. WELLDON, D.D.
SYDNEY T. KLEIN, ESQ., F.L.S., F.R.A.S., M.R.I.
COLONEL C. E. YATE, C.M.G., C.S.I.
WILLIAM J. HORNER, ESQ.
FREDERIC S. BISHOP, ESQ., M.A., J.P.

* *Members of Council.*

† *Life Members or Life Associates.*

‡ *Specially Elected.*

¶ *Distinguishes those who have contributed Papers to the Institute.*

ℱ *Foundation Members or Associates (elected before Dec. 31, 1866).*

f.c. Finance Committee (Six Members).

✠ *Those through whom legacies have been received.*

MEMBERS.

A.

1876 Aitken, Rev. Canon W. Hay M. H. M.A. Oxon.
1895 Alves, Lt.-Colonel M. A. R.E.
1901 Ami, Professor Henry M. M.A. D.Sc. F.G.S. F.R.S Canada.

B.

1882 †Baring, Rev. F. H. M.A. Camb. F.R.G.S.
1869 †Barker, John L. Esq.
1881 Barton, James, Esq. B.A. M. Inst. C.E.
1901 †Bell, Colonel Alexander W. C. (late Indian Army).
1903 Bermuda Library, Trustees of.
1873 Bevan, Francis A. Esq. J.P.
1887 Biddle, D. Esq. M.R.C.S.E. F.S.S. Memb. Aeronaut. Soc. of Great Britain.
1879 *Bishop, F. S. Esq. M.A. Oxon. M.A. Cantab. J.P.
1908 Bowles, Edward Augustus, Esq. M.A. Cantab. F.L.S. F.E.S.
1907 Braun, Mrs. Annie E. von.
1884 Brown, Rev. Claud, M.A. Oxon.
1889 Browne, John, Esq. C.E.
1907 Bruce, Rev. John Collingwood Gainsford, M.A.
1896 *Buxton, Sir T. Fowell, Bart. K.C.M.G. F.R.G.S. (Vice-President).

C.

1891 Carr, Rev. Arthur, M.A., late Fell. Oriel, Hon. Sec. Cent. Soc. Higher Relig. Educ.
1894 Chapman, Geo. John, Esq. M.A. S.C.L. F.Z.S.

1896 Chinnery, H. J. Esq. J.P.
1900 Choles, Lt.-Colonel Frederick J. F.R.G.S. F.I.Inst., Mem. Society of Arts, Chief Ordnance Officer Natal Defence Dep.
1904 Clough, G. Benson, Esq.
1890 Collins, Brenton H. Esq. J.P.
1889 Cooper, S. Joshua, Esq.
1871 †Coote, Sir A. C. P. Bart. M.A. Camb. F.R.G.S.
1887 Corke, H. C. Esq. D.D.S. F.R.S.L.
1905 Corrie, Josiah Owen, Esq. B.A. F.R.A.S. *Barr.*
1872 Coxhead, Rev. J. J. M.A.
1897 Cunningham, Francis A. Esq. M.A. B.Sc. Attorney-at-Law.

D.

1871 †Day, William, Esq.
1903 Deacon, J. F. W. Esq. M.A. J.P. D.L.
1889 †Dodge, Rev. D. Stuart, M.A.
1899 Drummond, Mrs. J. M. A.
1903 Ducie, Right Hon. The Earl of, F.R.S. F.G.S.

E.

1882 †Ellis, Alston, Esq. A.M. Ph.D. LL.D.

F.

1902 Faber, Mrs. Mary A.
1878 Fairfax, Sir James R.
1904 Finn, Alexander, Esq. F.R.G.S., British Consulate, Chicago, U.S.
1902 Foote, Robert Bruce, Esq. F.G.S.
1875 *Fox, Rev. Prebendary H. E. M.A. Camb.
1876 Freeman, Miss F. H.
1892 Fremlin, R. H. Esq.
1889 Fremlin, R. J. Esq.

G.

1904 Galloway, Professor William, F.G.S.
1892 *Geary, Lieut.-General Sir H. L. K.C.B. R.A. (Vice-President.)
1877¶*Girdlestone, Rev. Canon R. B. M.A.
1875 †Godson, E. Probyn, Esq. B.A. Camb.
1896 †Gregg, Rev. David, D.D. LL.D.

H.

1899 *Halliday, General J. G.
1888 Halsbury, The Right Hon. Hardinge Stanley Giffard, Earl of, K.G. P.C. F.R.S. (President.)
1901 Harrison, Edgar Erat, Esq.
1882 Head, J. Merrick, Esq. F.R.G.S.
1893 *Heath, Captain G. P. R.N.
1890 Hellier, Rev. Henry Griffin, Balliol Coll. Oxon.
1906 Hershensohnn, Joshua R. Esq.
1879 †Hingston, C. A. Esq. M.D. B.Sc. Lond.
1893 Holman, F. A. Esq.
1895 Hooper, George Norgate, Esq. F.R.G.S. F.S.S.
1906* Horner, William J. Esq.
1873¶*Howard, David, Esq. D.L. F.C.S. F.I.C. (Vice-President.)
1873 Howard, R. Luke, Esq. F.R.M.S.
1873 Howard, Theodore, Esq.
1873 †Howard, W. Dillworth, Esq.
1891 ¶Hudleston, W. H. Esq. M.A. F.R.S. F.G.S. F.R.G.S. F.C.S. F.L.S. (Vice-President).
1888*†¶Hull, Professor E. M.A. LL.D. F.R.S. F.G.S.; late Director of the Geological Survey of Ireland, Acad. Sci. Philad. Corresp. Soc. Geol. de Belg. (Secretary) (Vice-President).
1901 Hull, Edmund C. P. Esq. J.P.
1888 Hutchinson, Rev. Canon, C. B. M.A. Exam. Chap. to Archbishop of Canterbury.

I.

1880 Ince, Rev. Canon W. D.D. Reg. Prof. Div. Oxf. Chap. to Bishop of Oxford.

J.

1891 †Jex-Blake, The Very Rev. T. W. D.D. Dean of Wells.

K.

1895 ¶Kidd, Walter Aubrey, Esq. M.D. B.S. M.R.C.S. F.Z.S.
1893 †Kinnaird, The Honourable Louisa E.
1900*¶Klein, Sydney T. Esq. F.L.S. F.R.A.S. F.R.M.S. F.E.S. M.R.I.

L.

1891¶†Lansdell, Rev. Henry, D.D. Memb. Rl. Asiatic Soc. F.R.G.S.

1898 Laurence, Miss M. A.
1875¶*Lias, Rev. Chancellor J. J. M.A. Hulsean Lecturer 1884.
1896 Logan, Rev. Samuel C. D.D. LL.D.
1887 Loveday, Miss L. E.

M.

1897¶*Mackinlay, Lieut.-Colonel George, late R.A. (*Hon. Auditor*).
1885 †Marshall, Rev. C. J.
1907 Martin, George H. Esq. M.D.
1901 Matthews, Ernest R. Esq. A.M.I.C.E. F.G.S.
1872 Matthews, John T. Esq.
✠ *†McArthur, Alexander, Esq. D.L. J.P. F.R.G.S. (Vice-Patron).
1885 McArthur, W. A. Esq. M.P.
1907 McKibben, Rev. W. D.D. LL.D.
1898 Molony, Edmund Alexander, Esq. (Indian Civil Service).
1877 Morgan, R. C. Esq.
1905 †Mortimer, Rev. Alfred G. D.D. Philadelphia.
1900 Mudd, Christopher, Esq. F.L.S.
1881 †Mullens, Josiah, Esq. F.R.G.S.

N.

1878 Nelson, The Right Hon. The Earl.
1881 Newton, Rev. Preb. Horace, M.A. Camb. Prebendary of York.

O.

1902 Olsen, Ole Theodor, Esq. D.Sc. F.L.S. F.R.A.S. F.R.G.S. Ord, Wasa, Sweden, Ord St. Olaf of Norway; St. Andrew's Terrace, Grimsby.

P.

1908 Parry, Rev. Loton.
1881 Patton, Rev. F.L. D.D. LL.D. Prof. Relations of Philosophy and Science to the Christian Religion, Principal, Princeton Theo. Seminary.
1890 Peebles, J. M. Esq. M.D. Ph.D.
1894 *Perowne, Edward Stanley Mould, Esq. F.S.A. (Hon. Treasurer.)
1896 †Petter, Rev. W. D. H. M.A. Camb.
1872 †Phené, J. S. Esq. LL.D. F.S.A. F.G.S. F.R.G.S.

1882 †Pogson, Miss E. Isis; F.M.S. Meteorological Reporter and Assist.-Govt. Astronomer, Madras.
1888 †Powell, Sir F. S. Bart. M.P. F.R.G.S.

R.

1880 Rivington, Rev. Cecil S. M.A. Hon. Canon of Bombay.
1900 Rosedale, Rev. H. G. M.A. D.D. Oxon. F.R.S.L.
1899¶*Rouse, Martin Luther, Esq. B.L.
1872 Rowe, Rev. G. Stringer.

S.

Scales, George J. Esq.
1903 Schuster, Rev. William Percy, M.A. Oxon.
1882 †Scott-Blacklaw, Alex. Esq.
1904 Sewell, Ebenezer J. Esq.
1887 Simons, Henry Minchin, Esq.
1889 †Simpson, Prof. Sir A. R. M.D.
1893 Smart, Francis G. Esq. M.A. M.B. F.L.S. F.R.G.S. F.S.A.
1873 Smith, Philip Vernon, Esq. M.A. LL.D.
1875 ¶Stewart, Rev. Alex. M.D. LL.D.
1892 †Stilwell, John Pakenham, Esq. J.P.
1885 †Strathcona and Mount Royal, Lord, G.C.M.G. LL.D. F.R.G.S. F.G.S. (Vice-President.)
1903 Streatfeild, Rev. G. S. M.A.
1903¶*Sutton, Arthur W. Esq. J.P., F.L.S.
1906 Sutton, Leonard, Esq. F.L.S.
1870 Sydney, The Most Reverend W. Saumarez Smith, D.D. Bishop of, Metropolitan of N.S.W. and Primate of Australia.

T.

1881 †Taylor, Rev. Canon Robert.
1906 Townley, Rev. Charles F. M.A.
1897 Townsend, Rev. Professor L. Tracy, D.D. LL.D.
1899 Tremlett, James Dyer, Esq. (Barr.-at-Law) M.A. Camb.
1871 *Tremlett, Rev. Dr. F. W. D.D. D.C.L. Hon. Ph.D. Jena Univ. F.R.G.S. Chaplain to Lord Waterpark, Eccles. Com. for American Prelates and the Univ of the South.
1889 Tritton, Joseph H. Esq. F.R.G.S. F.S.S.
1894¶*Tuckwell, Rev. John, M.R.A.S.
1883 Turton, Lt.-Col. W. H. D.S.O. R.E. F.R.G.S.

U.

1889 Urquhart, Rev. John (winner of the Gunning Prize, 1905).
1880 Usherwood, The Ven. Archdeacon T. E. M.A.

V.

1875 †Veasey, H. Esq. F.R.C.S.

W.

1876¶*Wace, Very Rev. H. D.D. Dean of Canterbury; Hon. Chap. to the Queen; late Principal of King's College, Lond.
1873 Walters, William Melmoth, Esq.
1878 †Watson, Rev. A. Duff, M.A. B.D.
1903 †Whidborne, Miss Alice M.
1888*¶†Whidborne, Rev. G. F. M.A. Camb. F.G.S. F.R.G.S.
1881 ¶Whiting, Rev. J. B. M.A. Camb.
JF Whitwell, Robert J. Esq., B.Litt.
1899 †Wigram, Rev. E. F. E. M.A.
1894 Williams, Colonel Robert, M.P.
1879 Willis, Right Rev. Alfred, D.D.
1887 Wilson, Rev. B. R. M.A.
JF Wright, Francis Beresford, Esq. M.A. Cantab. J.P. F.R.H.S.
1907 Wright, Rev. Professor George Frederick, D.D. LL.D. F.G.S.A.

Y.

1876 Young, C. E. Baring, Esq. M.A. F.R.G.S.

ASSOCIATES.

1878 Adams, Rev. Canon James.
1894 Adams, Rev. R. M.A. T.C.D.
1894 Adams, Rev. W. W. D.D.
1871 Allen, J. Esq. (Hon. Auditor).
1896 Anderson, Sir Robert, K.C.B. LL.D.
1888 †Andrews, Rev. Walter, M.A.
1869 †Armagh, The Most Rev. W. Alexander, D.D. D.C.L. Archbishop of. Primate and Metropolitan of all Ireland.
1905 Arnström, Rev. D. A.
1887 Arrowsmith, E. M. Esq.
1887 Ashby, Robert, Esq.
1888 ¶Ashwin, Rev. C. Godfrey, M.A.
1906 Ashwin, Rev. Forster, B.A.
1891 †Atkinson, Rev. Edward, D.D. Master Clare Coll. Cambridge.
1898 Awdry, Rt. Rev. W. D.D. Bishop of Tokyo.
1892 Bacon, Rev. T. S. D.D.
1876 Badger, Rev. W. C. M.A.
1906 Baker, Lt.-Colonel W. W. R.E.
1882 Ballard, Rev. F. M.A. B.Sc. Lond. B.D. F.G.S.
1893 Barlow, Rev. C. H. M.A. Oxon. Chap. Bengal.
1902 Barton, Rev. Professor G. A Ph.D.
1906 Bent, Mrs. Theodore.
1887 Berry, Rev. Canon D. M. M.A. Oxon. Demi of Magd. Ellerton Prizeman.
1894 Bevan, Ven. Archdeacon H. E. J. M.A. Camb. Gresham Prof. of Divinity.
1890 †Bigelow, Professor Melville M. Ph.D.
1906 Bilbrough, Henry B. Esq.
1874 Billing, Rev. F. A. M.A. LL.D. F.R.S.L.
1888 Bird, Arthur, Esq. F.R.G.S.
1904 †Birkett, Rev. Arthur Ismay, M.A.
1905 Blakeslee, Rev. E. M.A. Boston.
1905 Blandy, Miss Grace.
1908 Bland, Hamilton, Esq. M.D.
1900 Bolton, Miss Elsie H.
1890 Bomford, Rev. L. G. M.A.
1902 Boord, Miss Eva J.
1891 ¶Boyd, Rev. T. Hunter.
1895 Breed, Rev. Professor David R. D.D.
1895 Breed, Rev. F. W. B.A. Durham.
1887 Bridgeman, Col. the Hon. Francis C.

1882 Broadbent, Colonel J. E. C.B. R.E.
1900 Brown, J. Walter, Esq.
1893 †Bryan, Joseph Davies, Esq.
1894*†¶Bullen, Rev. R. Ashington, B.A. F.L.S. F.G.S.
1893 Buswell, Ven. Archdeacon H. D.
1892 †Butt, Rev. Canon G. H. B.A.
1889 †Cain, Rev. John.
1907 Carus-Wilson, Henry, Esq.
1894 Carroll, A. Esq. M.D. D.Lit. Ph.D. D.Sc.
1889 †Caudwell, Eber, Esq. M.R.C.S.E. L.R.C.P.
1890 †Caudwell, Paul, Esq. B.A. Solicitor.
1894 Chambré, Very Reverend A. St. J. B.A. M.A. D.D. Dean.
1906 Chambré, Colonel H. W. Alan.
1889 Chatterton, Rev. F. W.
1884 Chichester, Rev. E. A. M.A. R.D. Hon. Canon of Winchester.
1888 Clapton, Edward, Esq. M.D. F.R.C.P. F.L.S. F.R.G.S.
1888 Clyde, Rev. J. C. A.B. A.M. D.D.
1891 †Cobern, Rev. Prof. Camden M. B.A. S.T.B. Ph.D.
1893 Cockin, Rev. J.
1906 Collett, Sidney, Esq.
1905 Collison, Harry, Esq. M.A. Barr.
1906 Cooke, Charles J. Bowen, Esq. M.Inst.C.E.
1885 †Coote, S. V. Esq. M.A. Oxon. F.R.G.S.
1887 *Creak, Captain Ettrick W. C.B. R.N. F.R.S.
1877 Crewdson, Rev. Canon G. M.A. Camb.
1908 Crewdson, Miss Gwendolen, M.A.
1878 Crofton, Lieut.-Gen. J. R.E.
1890 Crosbie, Rev. Howard A. M.A.
1890 Cruddas, W. D. Esq. D.L. J.P.
1892 Cuming, George W. Esq.
1886 Dakota, Right Rev. W. H. Hare, D.D. Bishop of.
1895 Darling, Rev. John Lindsey, M.A. T.C.D.
1884 Daunt, Rev. Canon W. M.A.
1905 Davidson, Rev. D. C. M.A.
1876 Dawson, Rev. W. M.A. F.R.H.S.
1880 Day, Rev. A. G. M.A. Oxon.
1888 Deedes, Ven. Archdeacon Brook, M.A.
1894 †Della Rocchetta, of Dolceacqua, Count Arthur, late Capt. in the General Staff of Italian Army.
1890 †De Witt, Rev. Prof. John, D.D.
1869 Dibdin, Charles, Esq. F.R.G.S. Sec. Rl. Nat. Lifeboat Inst. Hon. Memb. Cor. Société des Institutions de Prévoyance.
1898 Dibdin, R. W. Esq. F.R.G.S.
1874 Dimond-Churchward, Rev. Prebendary M. D. M.A.
1894 Dix, Rev. Morgan, S.T.D. D.D. D.C.L.
1907 Dixon, Rev. Edwin Church, M.A. S.T.B.

1897 Drake-Broekman, William Drake, Esq., late Sup. Engineer P.W.D. India; late A.I.C.E.
1888 Dunleath, The Rt. Hon. H. L. Lord.
1885 Durham, The Rt. Reverend H. C. G. Moule, D.D. Bishop of.
1880 Du-Santoy, Mrs. F. P.
1906 Eaton, Edmund Esq. C.E.
1883 Ebbs, Miss Ellen Hawkins.
1891 Eckersley, Rev. Jas. M.A.
1889 †Eddy, Mrs. Mary B. G. President Mass. Metaph. Coll.
1885 ¶†Elwin, Rev. Arthur.
1902 Emmet, Rev. William E. M.A. Oxon.
1880 Escott, Rev. Hay Sweet, M.A.
1886 Evans, Mrs. H. M.
1896 Evington, Right Rev. Bishop H. D.D. (Bishop in Kiushiu, S. Japan).
1899 Fairbairn, H. A. Esq. M.D. M.A.
1899 †Farquharson, Mrs. M.
1892 Feilden, J. Leyland, Esq.
1905 Fells, J. M. Esq.
1903 Ferguson-Davie, Rev. Charles James, M.A. Trin. Coll. Camb.
1876 Field, Rev. Arthur T. M.A. Camb.
1896 †Field-King, J. M.D. C.S.D.
1879 Finnemore, Rev. J. M.A. Ph.D. F.G.S.
1885 Fleming, Rev. R. H. B.A. D.D.
1881 Fleming, Sir Sandford, K.C.M.G. LL.D. F.G.S. F.R.G.S. V.-President Royal Soc. of Canada.
1900 Flint, Charles A. Esq.
1889 †Florida, The Right Rev. E. G. Weed, D.D. S.T.D. Bishop of.
1897 Flournoy, Rev. Parke Poindexter, D.D.
1894 †Forster, Miss E. J.
1882 †Fox, C. Dillworth, Esq.
1904 Fraser, Rev. Charles Vincent.
1904 ¶Frost, Edward P. Esq. D.L. J.P.
1900 Gardiner, E. J. Esq.
1873 †Gardner, Mrs. Ernest L.
1897 Garnett, Thomas, Esq.
1899 †Gedge, Sydney, Esq. M.A. F.R.G.S.
1899 Gibbon, Major J. Aubrey, R.E.
1877 Goe, Right Rev. Bishop F. F. D.D.
1903 Goodridge, Richard E. W. Esq.
1881 Gray, Charles, Esq.
1903 Gray, Brigade Surgeon Robert, M.D.
1877 Greenstreet, Colonel W. L. R.E.
1897 Greer, Mrs. Thomas.
1893 Greg, R. Philips, Esq. J.P. F.S.A. F.G.S.
1902 Gregg, Ivo Francis Hy. Carr, Esq. M.B.A.A.

1881 Grey, Rev. H. G. M.A.
1901 ¶Griswold, Rev. H. D. M.A. Ph.D.
1897 Gutch, George A. Esq. C.E.
1899 Haile, A. S. Esq.
1892 Hall, Hugh Fergie, Esq. M.A. F.G.S.
1903 Hamlyn-Harris, Dr. Ronald, D.Sc. F.G.S. F.L.S.
1896 Hanna, His Honour Judge Septimus J. LL.D.
1899 Harlowe, David, Esq.
1901 Harmer, F. W. Esq. J.P. F.G.S.
1878 Harper, The Ven. Archdeacon H. W. M.A.
1907 Harris, H. Neville, Esq.
1904 Heaton, James Esq. Memb. Soc. Arts.
1903¶*Hendley, Colonel Thomas Holbein, C.I.E. (Indian Medical Service, *retired*).
1908 Hendley, Lieut.-Col. Harold, I.M.S. M.R.C.S. M.D. Durh. D.P.H. Camb.
1889 †Herbert, Rev. Edward P.
1896 Hewitt, David Basil, Esq. B.A. L.R.C.S. L.R.C.P. J.P.
1882 Hicks, Rev. Edward, M.A. D.D. D.C.L.
1891 Higgens, T. W. E. Esq. A.M.I.C.E.
1892 †Hildesley, Rev. Principal A. H. M.A. Sanawar.
1901 Hodges, Rev. Albert H.
1897 Hodgson, Rev. William, M.A. Oxon.
1902 †Hogarth, Rev. Oswald J. M.A.
1890 Hooper, Charles H. Esq.
1904 Hopkins, F. D. Esq. Y.M.C.A. (U.S.A.)
1883 †Honstoun, G. L. Esq. F.G.S.
1902 Howard, Sir Frederick, J.P.
1888 Howard, Joseph, Esq. B.A. Lond. M.P. F.R.G.S.
1903 Hull, Charles Murchison, Esq. Civil Service, Natal.
1900 Hull, Edward Gordon, M.A. M.D. Dub.
1897 Hutton, Henry, Esq.
1890 Hyslop, Rev. James, M.A. Ph.D.
1904 ¶Irving, Rev. Alexander, D.Sc. F.G.S.
1902 †Jacob, Colonel Sir S. Swinton, K.C.I.E. Jaipur.
1898 Janvier, Rev. Cæsar A. Rodney, M.A. (Princeton).
1904 Jenkins, J. Heald, Esq. M.A.
1902 Jessop, Arthur, Esq.
1877 Jewell, F. G. Esq.
1907 Jewett, Rev. Professor Frank L. B.A. B.D.
1907 Job, Rev. Charles Robert M.A. Camb.
1891 Johnson, C. R. Esq. H. Sec. Brighouse Ch. Lit. Club.
1896 †Johnstone, Miss J. A.
1907 Job, Rev. Charles Robert. M.A. Camb.
1879 Kaye, The Ven. W. F. J. M.A. Oxon. Archdeacon and Canon of Lincoln.
Kemble, Mrs. Stephen Cattley.
1892 Kennedy, James, Esq. B.C.S. (Ret.) M.R.A.S.
1898 Kerr, Robert, Esq.

1884 Kimball, John E. Esq. A.M. Yale (Sup. Pub. Sc.)
1883 Kimm, Rev. W. F. M.A. late Fell. Cath. Coll. Camb.
1908 Kizer, Rev. Edwin D.
1887 Kirkpatrick, Rev. R. C. M.A. Oxon. and Dub.
1880 †Knight, Rev. C. F. M.A. Camb.
1908 Kwang, Sim Boon, Esq. Singapore.
1884 Lach-Szyrma, Rev. W. S. M.A. Oxon.
1905 Lampe, Rev. Joseph L. D.D.
1873 Lawrence, Ven. Archdeacon C. D. M.A.
1903 Lea, Alfred, Esq.
1873 Lea, Miss G. E.
1905 Lees, Rev. Harrington Clare M.A.
1901 Lefroy, The Right Rev. G. A. D.D. Bishop of Lahore, India.
1885 Lefroy, The Very Rev. W. M.A. Dean of Norwich.
1873 †Lewis, Rev. J. S. M.A.
1897 Linton, E. C. Esq. M.A. Camb.
1900 ¶Lobley, Professor James Logan, F.G.S. F.R.G.S.
1883 †Lock, Rev. W. M.A. D.D. Oxon. Fell. Jun. Bursar and Tutor of Magdalen, Warden of Keble College.
1878 Locke, Rev. J. G. T.C.D. Senr. Fresh. 1888.
1892 †Logan, The Honourable James D.
1908 Longdon, Miss Caroline Mary.
1901 Lönnbeck, Fredrick Waldemar, Stockholm.
1887 Lowber, Rev. Chancellor J. W. M.A. LL.D. D.C.L. Sc.D. Ph.D. P.S.D. F.R.G.S. Litt.D.
1888 Lowrie, Rev. S. T. M.A. D.D.
1904 MacGregor, Ronald, Esq. H.M.C.S.
1882 Maitland, Rev. H. F. M.A. Oxon.
1908 Manley, Rev. G. T. M.A. Camb.
1902 Manwaring, George A. Esq. C.E.
1893 †Martineau, A. E. Esq. (Ind. Civ. Serv.).
1892¶†Masterman, E. W. Gurney, Esq. F.R.C.S. F.R.G.S. D.P.H.
1888 Maxwell of Calderwood, Lady.
1894 Mead, Rev. Charles Marsh, Prof. Th.
1892 ¶Mello, Rev. J. Magens, M.A. F.G.S.
1879 Methuen, Rev. T. Plumptre, M.A.
1889 Millingen, J. R. Van, Esq.
1908 Milner, Rev. W. M. H. M.A. Oxon. F.R.G.S.
1903 Mitchinson, Right Rev. Bishop J. D.D. D.C.L.
1899 Moffat, Rev. J. S. C.M.G.
1892 †Molony, Major Francis A. R.E.
1907 Moore, Rev. Henry N. M.A.
1882 Moule, Ven. Archdeacon A. E. B.D. (Mid China).
1878 †Mullings, John, Esq.
1893 Munt, George William, Esq.
1871 †Nelson, J. H. Esq. M.A.
1885 †Neve, A. Esq. F.R.C.S. L.R.C.P. Edin.
1888 †Nimr, Faris, Esq. (Ed. "Mouktataf"), Cairo.

1887 Norbury, Inspector-Gen. Sir H. F. K.C.B. M.D. F.R.C.S. R.N.
1880 Nursey, Rev. Percy Fairfax, M.A. Oxon.
1879 †Oake, Rev. R. C.
1886 Oates, Rev. Alfred.
1880 O'Dell, Professor Stackpool E.
1902 ¶Odling, Charles W. Esq. C.S.I.
1891* ¶Orchard, H. Langhorne, Esq. Prof. of Logic, M.A. B.Sc.
1899 Orr, Major Walter Hood, I.M.S.
1891 Oulton, Rev. Richard Charles, M.A. B.D.
1902 Paine, Robert Treat, Esq.
1898 Parker, Rev. Alvin Pierson, D.D.; President, Anglo-Chinese College, Shanghai.
1905 Partridge, Deputy Surgeon-General W.P.
1883 Paterson, Rev. T. M. B.
1903 Payne, George Herbert, Esq.
1885 †Payne, J. A. Otomba, Esq. F.R.G.S. Chief Registrar and Taxing Master of the Supreme Court of Lagos.
1894 Peake, A. S. Esq. M.A. Oxon Fell. Merton, late Tutor Mansfield Coll. Oxon.
1887 †Penford, Rev. E. J.
1903 Petch, Rev. Charles Cousens, B.A.
1908 Pierce, Harold, Esq.
1894 Pike, Rev. Sidney, M.A. Camb.
1884 Piper, F. H. Esq.
1881 Pippet, Rev. W. A.
1896 Plantz, Rev. President Samuel, D.D. Ph.D.
1882 Postlethwaite, J. Esq. F.G.S.
1898 Potter, Ven. Archdeacon Beresford, M.A. T.C.D.
1881 Pratt, Rev. J. W. M.A. D.D.
1908 Preston, Walter R. Esq.
1880 †Priestley, Rev. J. J. S.P.G.
1888 †Pringle, of Torwoodlee, Mrs.
1903 Proctor, Henry, Esq. H.M.C.S. M.R.A.S. F.R.S.L.
1891 Reddie, Edward J. Esq.
1894 Reed, F. R. Cowper, Esq. B.A. F.G.S. Asst. to Woodwardian Prof. of Geology Camb.
1876 Rendell, Rev. Canon A. M. M.A. Camb.
1899 Revie, Rev. Dugald, M.B. C.M. Glas. Univ. Free Church of Scot. Medical Mission.
1877 Rhodes, Rev. D.
1903 Rice, Hon. and Rev. W. Talbot, M.A. Oxon.
1882 Ridley, Rt. Rev. Bishop W. D.D.
¶*Rigg, Rev. J. H. D.D. Principal of the Wesleyan Training College, Ex-President of the Wesleyan Conference.
1885 Riggs, Rev. J. F. B.A. M.A. D.D.
1899 ¶Robinson, Rev. Andrew Craig M.A.
1895 Robinson, Maj.-General C. G. R.A.
1894 Rogerson, Rev. Geo M.A.

1906 Roscoe, John Henry, Esq.
1884 †Ross, Rev. G. H. W. Lockhart, B.A.
1908 Rouse, Miss Ellen.
1891 Rouse, Rev. G. H. LL.B.
1881 Royston, The Right Rev. Bishop P. S. D.D.
1903 Ryan, Hugh S. K. Esq. M.A. Camb.
1883 St. Andrew's University, Court of; Stuart Grace, Esq. Factor.
1891 St. Johns, New Brunswick Free Pub. Lib. J. R. Reul, Esq. Chairman.
1903 Salmensaari, Herra Sulo, B.A. Finland.
1881 Sandford, H. Esq.
1895 Saskatchewan, Right Rev. J. Newnham, D.D. Bishop of.
1891 ¶Schofield, Alfred Taylor, Esq. M.D.
1906 Searle, Malcolm W. Esq. K.C. M.A. LL.B.
1876 †Secley, Rev. E.
1875 Sharp, Rev. J. M.A. Queen's Coll. Oxon.; Editorial Superintendent, Bible Soc.
1902 Sharpe, W. E. Thompson, Esq. M.A.
1882 Shepherd, Mrs. F. Wolfskill De.
1901 †Sherard, Rev. Clement E. M.A. Camb.
1882 Shore, Captain the Hon. H. N. R.N.
1906 Sidebottom, Colonel W.
1876¶*†Sinclair, The Ven. Archdeacon W. Macdonald, M.A. D.D. form. Sch. of Balliol, Oxon.
1907 Smith, Mrs. Aline Gerard.
1892 Smith, Hon. Sir Charles Abercrombie, M.A. Fell. St. Peter's Coll. Camb.
1901 †Smith-Bosanquet, Miss Ella.
1873 Smith, Major-General E. Davidson.
1896 Smith, Colonel George Hugh.
1893 Smith, Sir George J. J.P. D.L.
1906 Smith, Heywood, Esq. M.A. M.D.
1906 Smith, Richard Tilden, Esq.
1891 Smith, S. Ashley, Esq. M.D.
1902 Smyth, William Woods, Esq. L.R.C.S. L.R.C.P.
1903 Spencer, Professor J. W. Ph.D. F.G.S.
1879 ¶Statham, E. J. Esq. C.E. A.I.C.E.
1879 †Stewart, Alex. Esq.
1872 Stewart, Sir Mark J. McTaggart, Bart. M.A. M.P.
1890 †Stokes, Anson Phelps, Esq. Vice-Pres. XIX Cent. Club U.S.A. Memb. Council, S.S. Assoc.
1894 Stokes, James, Esq. Officer of the Legion of Honour.
1887 Stokes, Rev. W. Fenwick, M.A.
1906 Stonier, George Alfred, Esq. F.G.S.
1903 Stovin, Mrs. Caroline.
1902 †Strong, John Alexander, Esq.
1902 †Strong, Rev. Rupert S. B.A. Camb.

1888 Sutton, M. J. Esq. J.P. F.L.S. F.R.G.S. Chev. Leg. of Honour.
1895 Swinburne, Hon. George, C.E.
1899 Symonds, Hon. J. W.
1899 †Talmage, Professor James E. Ph.D. F.R.M.S. F.G.S. F.R.S.E. F.G.S.A.
1873 Tapson, Rev. R. K.C.L.
1905 Tasker, Rev. Professor J. G. D.D.
1882 Taylor, Rev. Hugh Walker, M.A.
1891 †Taylor, Rev. Stephen, B.A. Corpus C. Coll. Camb.
1893 Teape, Rev. W. Marshall, A.B. M.A. Edin. and Camb. Vicar of South Hylton, Sunderland.
1905 Thomas, Rev. W. H. Griffith, D.D. Principal Wycliffe Hall, Oxford.
¶Thornton, the Right Rev. Samuel, D.D. late Bishop of Ballarat.
1906 Tindall, Miss Caroline.
1894 Tinsley, Rev. Peter D.D.
1873 Tomkins, Rev. W. Smith.
1908 Treanor, Rev. Thomas Stanley, M.A., T.C.D.
1907 Trench, Mrs. Charles Chevenix.
1902 Trumbull, C. G. Esq. Philadelphia.
1908 Turnbull, G. L. Esq. M.A. M.D. Oxon.
1903 ¶Turner, Rev. F. Storrs, B.A.
1882 Tuttle, Right Rev. D. S. D.D. Bishop of Missouri.
1902 Twigg, John Hill, Esq. late India Civil Service.
1898 Tydeman, E. Esq. B.A. F.R.G.S. Lawrence Military Asylum.
1907 Ussher, W. A. E. Esq. F.G.S.
1906 Van Someren, Colonel G. J.
1876 Waiapu, Right Rev. William Leonard Williams, B.A. Bishop of.
1893 Waller, Rev. C. Cameron, M.A. Camb. Principal of Huron Coll.
1906 Wallington, Charles, Esq.
1892 Walter, Rev. H. M. M.A. Oriel Oxon.
1894 Ward, H. B. Esq.
1904 Wardle, Sir Thomas, J.P. F.G.S.
1881 Waring, F. J. Esq. C.M.G. M.Inst.C.E.
1882 †Warrington, Miss E.
1895 Way, the Right Hon. Sir Samuel James, D.C.L. LL.D. Chief Justice S. Aust.
1895 Weaver, George M. Esq.
1879 Webb-Peploe, Rev. Prebendary H. W. M.A. Camb.
1898 Weightman, Miss Ialice.
1893*† Welldon, Right Rev. Bishop J. E. C. D.D. Dean of Manchester.
1889 †Wellington, Right Rev. Frederic Wallis, D.D. Bishop of.
1887 Wherry, Rev. E. M. D.D. Lodhiana, Punjâb, India.

1907 White, Rev. G. E. M.A. B.D.
1882 White, Rev. J. M.A. T.C.D. Hon. M.A. Magd. Oxf.
1894 †Whitehead, Rev. George B.A. Lond.
1870¶†Whitmee, Rev. S. J. F.R.G.S. Cor. Mem. Z.S.
1881 †Williams, H. S. Esq. M.A. F.R.A.S. A.C.
1882 Willis, The Ven. Archdeacon W. N.
1896 Wills, Harold Temple, Esq. M.A. B.Sc.
1907 Winfield, Rev. J. Abbott.
1885 Winslow, Rev. W. C. D.D. D.C.L. LL.D. L.H.D. D.Sc. S.T.D. Ph.D. Amer. Vice-President Egypt Exploration Fund.
1889 †Winter, The Ven. Archdeacon G. Smith.
1887 Wolf, Rev. L. B. D.D. Principal A.E.L.M. College, Guntur.
1877 Wood, Rev. Canon A. Maitland, M.A.
1893 Wood, Peter F. Esq. F.R.G.S.
1899 Wood, Walter James, Esq. F.R.M.S.
1892 †Woodd, Rev. C. H. Basil, M.A. Camb. Nat. Sci. Trip 1890, M.A.
1883 Woodward, Rev. Canon H. D.D.
1877 Worthington, T. Esq. B.A. T.C.D.
1903 †Wright, Rev. Ernest Alexanderson, M.A.
1907 *Yate, Colonel C. E. C.S.I. C.M.G.
Young, Rev. Charles, M.A. Camb.
1894 Zimmerman, Rev. Jeremiah, M.A. D.D. LL.D.

CLERK.

1884 Montague, Mr. A. E.
87, *St. Paul's Road, Camden Square, N.W.*

LIBRARY ASSOCIATES.

Adelaide Public Library, *South Australia.*
Berlin Royal Library (per Asher & Co.).
Birmingham Free Library.
Boston Public Library (per Kegan Paul & Co.).
Chicago University, *U.S.A.*
Dublin Society, Royal.
T Harvard University (per Kegan Paul & Co.).
T Librairc Le Soudier, 174B, *St. Germaine, Paris.*
Manchester, The John Rylands Library.
L Melbourne Public Lib. and Museum, *Melbourne, Victoria.*
L Mitchell Library (F. T. Barrett, Esq.), 21, *Miller Street, Glasgow.*
Newcastle-on-Tyne Public Library.
New York Public Library, *New York, U.S.A.*
Nottingham Public Library.
L Ottawa, Library of Parliament.
Rochester Theological Seminary, *U.S.A.*
Rugby School Library.
Sydney Free Library, *New South Wales.*
M Texas University, *Austin, Texas, U.S.A.*
Worcester Public Library, *Mass., U.S.A.*

HON. CORRESPONDING MEMBERS.

HOME.

1902 ¶Ball, Sir R. S. LL.D. F.R.S. Prof. of Astronomy, Camb. *The Observatory, Cambridge.*

1889 ¶Conder, Colonel Claude Reignier, R.E. D.C.L. *Mona, Tivoli Road, Cheltenham.*

1890 ¶Geikie, Prof. James, D.C.L. LL.D. F.R.S. F.R.S.E. F.G.S.; Prof. Geo. and Min. Univ. Edin. Hon. Mem. Phil. Soc. York, Geo. Soc. Stockholm and Geo. Palæo. Hydrol. Belg. Memb. Amer. Phil. Soc. Cor. Memb. Acad. Sci. Phila. 31, *Merchiston Avenue, Edinburgh.*

1908 Gill, Sir David, K.C.B. LL.D. F.R.S. 34, *De Vere Gardens, Kensington, W.*

1881 ¶Guppy, H. B. Esq. M.B. F.G.S. Mem. Min. Soc. &c. *Rosario, Salcombe, S. Devon.*

1903 Howorth, Sir Henry H. K.C.I.E. F.R.S. 30, *Collingham Place, S.W.*

1888 ¶Hughes, Prof. T. M'K. M.A. F.R.S. F.S.A. F.G.S.; Woodwardian Prof. of Geology, Cambridge, Trin. Coll. Camb. *Ravensworth, Brooklands Avenue, Cambridge.*

1878 Mitchinson, The Right Rev. J. D.D. D.C.L. Archdeacon of Leicester, Hon. Fell. Pemb. Coll. Oxf.; Coadj. Bp. of Peterborough; Hon. Canon of Canterbury.

1903 ¶Petrie, Prof. W. Flinders, D.C.L. 18, *Well Road, Hampstead, N.W.*

1889*¶Pinches, Theo. G. Esq. LL.D. 38, *Blomfield Road, Maida Hill, W.*

1878 ¶Rassam, Hormuzd, Esq. F.R.G.S. 30, *Westbourne Villas, Hove, Brighton.*

1889 ¶Sayce, Rev. Prof. A. H. M.A. LL.D. Fellow and Tutor Queen's Coll. Oxford.

1899 Turner, Sir William, V.D. M.B. LL.D. D.C.L. D.Sc. F.R.S. Prof. Anatomy, Univ. Edin. 6, *Eton Terrace, Edinburgh.*

1905 Woodward, Dr. Henry F.R.S. F.G.S. 129, *Beaufort Street, Chelsea.*

FOREIGN.

1895 His Majesty King Momolu Massaquoi, West Africa.

1881 Abbe, Professor Cleveland, M.A. Assistant in the office of the Chief Signal Officer of the Weather Bureau, U.S.A.

1888 Agassiz, Alexander, Esq. D.C.L. Prof. of Comp. Zoology, Cambridge, Mass. U.S.A.

1895 Hilprecht, Rev. Professor H. V. D.D. *Univ. of Pennsylvania, U.S.A.*
1893 Hommel, Prof. Fritz, Ph.D. LL.D. Prof. of Semitic Languages in Univ. of Munich, *Leopolds Strasse* 81 *Munich.*
1889 d'Hulst, Count Riamo, *Cairo.*
1895 Lugard, Brigadier-General F. J. D. C.B. D.S.O.
1896 ¶Macloskie, Prof. G. D.Sc. LL.D. Prof. Biology (Princeton), U.S.A.
1883 ¶Maspero, Prof. G. D.C.L. *Collège de France, Cairo, Egypt;* 24, *Avenue de l'Observatoire, Paris.*
1904 Nansen, Prof. Fridtjof. D.Sc. LL.D. D.C.L. *Lysaker, Norway.*
1883 ¶Naville, E. D.Lit. Ph.D. *Malagny, Geneva, Switzerland.*
1895 Sabatier, Professor Armand, M.D. *Montpellier, France.*
1898 Stosch, Rev. Prof. D.D. 24, *Lutzow Street, Berlin.*
1904 ¶Upham, Warren, Esq. M.A. D.Sc. F.G.S. Amer. Sec. Minnesota Historical Society.
1898 Zahn, Rev. Prof. T. H. *Erlangen.*

SPECIAL.

1878 Auckland, The Most Rev. W. G. Cowie, D.D. Bishop of.
1883 Beckwith, The Right Rev. J. W. D.D. *U.S.A.*
1878 Fredericton, The Most Rev. the Lord Bishop of.
1878 Haïti, The Right Rev. J. T. Holly, D.D. Bishop of, *Port-au-Prince, Haïti.*
1884 Herzog, Right Rev. E. D.D. Bishop of the Old Catholic Ch. of Switzerland, *Berne.*
1878 Jaggar, Right Rev. Bishop T. A. D.D. Bishop of S. Ohio, *Episcopal Rooms, Cincinnati, Ohio, U.S.A.*
1892 Lucknow, Right Rev. A. Clifford, D.D. Bishop of, *Allahabad, India.*
1886 Mylne, Right Rev. L. G. D.D. *St. Mary's Vicarage, Marlborough, Wilts.*
1888 North China, Right Rev. C. P. Scott, Bishop of, *Cheefoo, North China.*
†1890 Ottawa, Right Rev. C. Hamilton, D.D. D.C.L. Bishop of.
1886 Truro, The Right Rev. J. Gott, D.D. Lord Bishop of.
1880 Vail, Right Rev. T. H. D.D. Bishop, *U.S.A.*
1878 Victoria, The Right Rev. J. S. Burdon, D.D. Bishop of, *St. Paul's College, Hong Kong* (care of Dickeson & Stewart, 4, *Queen Victoria Street, E.C.*).
1890 Wakefield, Right Rev. G. R. Eden, D.D. Bishop of.

HON. CORRESPONDENTS.

Anderson, J. F. Esq. F.R.G.S. *Melrose, Curepipe, Mauritius.*
Baker, Rev. W. M.A. 40, *Mapperley Road, Nottingham.*
Batchelor, W. Esq. 7, *Agnes Road, Northampton.*
Black, Surgeon-Major W. G. F.R.C.S.E. 2, *George Square; and Caledonian United Service Club, Edinburgh.*
Bliss, Rev. T. *Yockleton Rectory, Shrewsbury.*
Brants, M. A. Esq. Ph.D. *Zelhem, near Doetinchem, Holland.*
Brown, Rev. J. B. M.A. *Feniscliffe Vicarage, Blackburn.*
Burke, Rev. R. G. M.A. LL.B. *Lilydale Melbourne.*
Caldecott, Rev. Professor A. M.A. B.D. *Rectory, North and South Lopham, Norfolk.*
Clarke, Rev. J. M. M.A. 2, *Elms Park Terrace, Ramsgate.*
Corbet, Frederick H. M. Esq. Barrister-at-Law, F.R.C.I. F.I.Inst. Hon. Executive Officer for Ceylon at the Imperial Institute, 42, *Kenilworth Avenue, Wimbledon.*
Dallinger, W. H. Rev. D.D. LL.D. F.R.S., *Ingleside, Newstead Road, Lee, S.E.*
Davis, Rev. W. B. M.A. *Ramsbury, Wilts.*
Dixon, Prof. J. M. *Washington Univ. St. Louis, Mo. U.S.A.*
East, Rev. H. E. *Leithfield, Christchurch, New Zealand.*
¶Eells, Rev. M., M.A. *Union City, Mason Co. Washington, D.C., U.S.A.*
Finn, Mrs. 75, *Brook Green, W.*
Fleming, Rev. T. S. F.R.G.S. *St. Clement's, Leeds* (𝔐).
Foster, Harry S. Esq. J.P. F.R.G.S. Consul for Persia.
Gissing, Admiral C. E. R.N. (*ret.*) F.R.G.S. *United Service Club, S.W.; Homedale, Dover Road, Walmer.*
Gubbins, Surgeon-General W. L. M.D. Army Medical Staff, *War Office*, 18, *Victoria Street, S.W.; St. John's, Worcester Park, Surrey.*
†Habershon, M. H. Esq. *Greenhead, Chapeltown, Sheffield.*
Harris, A. H. Esq. c/o I.M. Customs, *Shanghai, China.*
Harrison, Rev. A. J. B.D. LL.D. *Magdalen Lodge, North End, Newcastle.*
Hassell, Joseph, Esq. *Brittany Lodge, London Road*, St. *Leonards.*
Hetherington, Rev. J. *St. Peter's Vicarage, Hull.*
Howard, Sir Frederick, J.P. *The Abbey Close, Bedford.*
Hudson, Rev. Canon J. C. M.A. *Thornton Vicarage, Horncastle.*
Hutchinson, Rev. A. B. *Fukuoka, Japan.*
Irving, Rev. A. D.Sc. F.G.S. *Hockerill V. Bishop's Stortford.*
Kydd, Robert, Esq. 164, *Stobcross Street, Glasgow.*
McLeod, Rev. R. F. *North Fambridge Rectory, Essex.*

Macpherson, Rev. A. C. M.A. *Shottery House, Beaufort Road, Clifton.*
¶Mello, Rev. J. M. M.A. F.G.S. *Mapperley V. Derby.*
Nutt, Rev. George, *The Rectory, Lluidas Vale, Jamaica.*
†Oates, Rev. W. *Somerset East, South Africa.*
†O'Donel, G. H. Esq. *Mission School, Seoni Chappara, C.P. India.*
Oliver, Rev. T. D.D. 118, *Hampton Road, Southport.*
Painter, Rev. W. Hunt, *Stirchley Rectory, Shifnal, Salop.*
¶Parker, Prof. H. W. 47, *7th Avenue, New York, N.Y. U.S.A.*
†Peet, Rev. Stephen D. Ph.D. Editor "American Antiquarian," 5817 *Madison Avenue, Chicago, Ill. U.S.A.*
Petherick, Rev. G. W. B.A. *St. Bartholomew's Rectory, Salford, Manchester.*
¶Post, Rev. Prof. G. E. M.A. M.D. D.D.S. F.L.S. Surgeon Johanniter Hosp. Syrian Protestant College, Beyrout.
Postlethwaite, J. Esq. F.G.S. *Eskin Place, Keswick, Cumberland.*
Ragg, Rev. F. W. M.A. *Marsworth Vicarage, Tring.*
Redman, Rev. J. *Hyderabad, Sindh, India.*
Richards, Rev. G. B. *Somercotes, Plympton, South Devon.*
†Robertson, Rev. Alex. D.D. *Ca' Straun, Ponte Della Salute, Venice.*
Ross, Rev. H. D.D. LL.D. F.C.S. Memb. R. Soc. of Arts of Port Louis, *Dallas House, Lancaster.*
Shipham, Rev. Arthur, *The Mound, Matlock Bridge.*
Simpson, Prof. A. T. *New College, Edinburgh.*
Stefansson, Jon, Esq. Ph.D.
Storrs, Rev. W. T. B.D. *Vicarage, Sandown, I.W.*
†Taylor, Rev. Canon R. *St. Stephen's, Newtown, Sydney, N.S.W.*
Thomas, Rev. James, British and Foreign Bible Society, 146, *Queen Victoria Street, E.C.*
¶Tisdall, Rev. W. St. Clair, M.A. *Julfa, Ispahan, Persia.*
Tomkins, Rev. H. G. *Park Lodge, Weston-super-Mare.*
Tyndall, Mrs. *Colepark, Twickenham.*
Walter, Rev. J. C. B.A. *Langton Rectory, Horncastle.*
Weidemann, Professor Alfred, Ph.D. 2, *König St. Bonn.*
Whiteway, Rev. R. W. B. *Beulah House, Selby, Yorks.*
Williams, W. Esq. Supt. Govt. Telegraphs, India (ret.), *Crofton, Combe Park, Bath.*
Willis, R. N. Esq. M.B. 2, *Carlton Terrace, Rathmines, Dublin.*
Willis, T. Gilbert, Esq. 4, *Kildare Street, Dublin.*
Winslow, Rev. W. C. Ph.D. D.D. D.C.L. LL.D. D.Sc. 525, *Beacon Street, Boston, U.S.A.*
Wright, Rev. C. H. H. D.D. T.C.D. M.A. Oxon. Ph.D. *Leipsic.* Bampton Lecturer, 1878, Donnellan Lecturer, 1880–81, 90, *Bolingbroke Grove, S.W.*
Zwemer, Rev. S. M. M.A. D.D. F.R.G.S. *Bahrein, Persian Gulf.*

MISSIONARY ASSOCIATES.

Bomford, Rev. Trevor, M.A. *Tarn Taran, Punjab.*
Byrde, Rev. Louis, B.A., *Nagoya, Japan.*
Carpentaria, Right Rev. Bishop of, Thursday Island, *Queensland.*
Garrett, Rev. J. G. M.A. *Kandy, Ceylon.*
Joseland, Rev. Frank P. *Amoy, China.*
Moule, Rev. W. S. B.A. *Ningpo, China.*
Mylrea, Rev. C. Stanley G. M.D. *Bahrein, Arabia.*
Reade, Miss F. *Thiruvithi, Panruti, S. India.*
Riggs, Rev. Charles T., *Bible House, Constantinople.*
Robinson, Miss L. G. *Berhampore, Bengal.*
Turner, Rev. G. Reynolds, M.B. *Hwei-an-hsein, S. China.*
Underwood, Dr. H. L. *Erzroom, Turkey.*
Woodley, Rev. E. C. *London Mission College, Calcutta.*

SOCIETIES EXCHANGING TRANSACTIONS WITH THE INSTITUTE.

American Academy of Arts and Sciences.
American Archæological Institute.
American Geographical Society.
American Geological Society.
American Journal of Philology (John Hopkins Press).
American Philosophical Society.
Anthropological Society, New York.
Anthropological Society, Washington.
Canadian Institute.
Colonial Museum of New Zealand.
Geographical Society of the Pacific.
Geographical Society of California.
Geological Society.
Harvard Museum of Comp. Zoology.
Manitoba Historical and Scientific Society.
Michigan, Agricultural College of, U.S.
New Zealand Institute.
Nova Scotian Inst. of Natural Science.
Royal Asiatic Society, Bombay.
Royal Colonial Institute.
Royal Dublin Society.
Royal Geographical Society.
Royal Institution.
Royal Irish Academy.
The Royal Society.
Royal Society of Canada.
Royal United Service Institution.
Smithsonian Institution (Washington).
Société Scientifique du Chili.
Society of Arts.
Society of Biblical Archæology.
Society of Biblical Literature, U.S.
Soc. Bib. Lit. and Exeg., Boston.
Sydney Museum, New South Wales.
Sydney Observatory, New South Wales.
United States Bureau of Ethnology.
United States Geological Survey.
United States Government Geological and Geographical Survey.
United States Government Reports.

OBJECTS, CONSTITUTION, AND BYE-LAWS

OF

The Victoria Institute,

OR

Philosophical Society of Great Britain.

Adopted at the First Annual General Meeting of the Members and Associates May 27th, 1867, with Revisions of 1874–75.

§ I. *Objects.*

1. The Victoria Institute, or Philosophical Society of Great Britain, is established for the purpose of promoting the following objects, viz.:—

First. To investigate fully and impartially the most important questions of Philosophy and Science, but more especially those that bear upon the great truths revealed in Holy Scripture; with the view of reconciling any apparent discrepancies between Christianity and Science.

Second. To associate together men of Science and authors who have already been engaged in such investigations, and all others who may be interested in them, in order to strengthen their efforts by association; and, by bringing together the results of such labours, after full discussion, in the printed transactions of an Institution: to give greater force and influence to proofs and arguments which might be little known, or even disregarded, if put forward merely by individuals.

Third. To consider the mutual bearings of the various scientific conclusions arrived at in the several distinct branches into which Science is now divided, in order to get rid of contradictions and conflicting hypotheses, and thus promote the real advancement of true science; and to examine and discuss all supposed scientific results with reference to final causes, and the more comprehensive and fundamental principles of Philosophy proper, based upon faith in the existence of one Eternal God, who, in His wisdom, created all things very good.

Fourth. To publish Papers read before the Society in furtherance of the above objects, along with full reports of the discussions thereon, in the form of a Journal, or as the Transactions of the Institute.

Fifth. When subjects have been fully discussed, to make the results known by means of Lectures of a more popular kind, and to publish such Lectures.

Sixth. To publish English translations of important foreign works of real scientific and philosophical value, especially those bearing upon the relation between the Scriptures and Science; and to co-operate with other philosophical societies at home and abroad, which are now or may hereafter be formed, in the interest of Scriptural truth and of real science, and generally in furtherance of the objects of this Society.

Seventh. To found a Library and Reading Rooms for the use of the Members and Associates of the Institute, combining the principal advantages of a Literary Club.

§ II. *Constitution.*

1. The Society shall consist of Members and Associates, who in future shall be elected as hereinafter set forth.

2. The government of the Society shall be vested in a Council (whose Members shall be chosen from among the Members and Associates of the Society and be professedly Christians), consisting of a President, two or more (not exceeding seven) Vice-Presidents, a Treasurer, one or more Honorary Secretaries, and twelve or more (not exceeding twenty-four) Ordinary Members of Council, who shall be

elected at the Annual General Meeting of the Members and Associates of the Institute. But, in the interval between two Annual Meetings, vacancies in the Council may be filled up by the Council from among the Members of the Society; and the Members chosen as Trustees of the funds of the Institute shall be *ex officio* Members of Council.

3. Any person desirous of becoming a Member or Associate shall make application for admission by subscribing the Form A of the Appendix, which must be signed by two Members of the Institute, or by a Member of Council, recommending the candidate for admission as a Member; or by any one Member of the Institute, for admission as an Associate.

4. Upon such application being transmitted to one of the Secretaries, the candidate for admission may be elected by the Council, and enrolled as a Member or Associate of the Victoria Institute, in such manner as the Council may deem proper; having recourse to a ballot, if thought necessary, as regards the election of Members; in which case no person shall be considered as elected unless he have three-fourths of the votes in his favour.

5. Application for admission to join the Institute being thus made by subscribing Form A, as before prescribed, such application shall be considered as *ipso facto* pledging all who are thereupon admitted as Members or Associates to observe the Rules and Bye-Laws of the Society, and as indicative of their desire and intention to further its objects and interests; and it is also to be understood that only such as are professedly Christians are entitled to become *Members*.

6. Each Member shall pay an Entrance Fee of One Guinea and an Annual Contribution of Two Guineas. A Donation of Twenty Guineas shall constitute the donor a Life Member.

7. Each Associate shall pay an Annual Contribution of One Guinea. A donation of Ten Guineas shall constitute the donor a Life Associate.

8. The Annual Contributions shall be considered as due in advance on the 1st day of January in each year, and shall be paid within three months after that date; or, in the case of new admissions within three months after election.

9. Any Member or Associate who contributes a donation in one sum of not less than Sixty Guineas to the funds of the Institute shall be

enrolled as a Vice-Patron thereof, and will thus also become a Life Member or Life Associate, as the case may be.

10. Should any member of the Royal Family hereafter become the Patron, or a Vice-Patron, or Member of the Institute, the connexion shall be regarded as purely Honorary; and none of the Rules and Bye-Laws relating to donations, annual contributions or obligations to serve in any office of the Society, shall be considered as applicable to such personages of Royal Blood.

11. Any Member or Associate may withdraw from the Society at any time, by signifying a desire to do so by letter, addressed to one of the Secretaries; but such shall be liable for the contribution of the current year, and shall continue liable for the annual contribution, until all sums due to the Society from such Member or Associate shall have been paid, and all books or other property borrowed from the Society shall have been returned or replaced.

12. Should there appear cause, in the opinion of the Council, for the exclusion from the Society of any Member or Associate, a private intimation may be made by direction of the Council, in order to give such Member or Associate an opportunity of withdrawing from the Society; but, if deemed necessary by the Council, a Special General Meeting of Members shall be called for the purpose of considering the propriety of expelling any such person: whereat, if eleven or more Members shall ballot, and a majority of those balloting shall vote that such person be expelled, he shall be expelled accordingly. One month's notice, at least, shall be given to the Members of any such Special General Meeting.

13. Non-resident Members and Associates, or others desirous of promoting the objects and interests of the Institute, may be elected by the Council to act as corresponding Members abroad, or as Honorary Local Secretaries, if within the United Kingdom, under such arrangements as the Council may deem advisable.

14. The whole property and effects of the Society shall be vested in two or more Trustees, who shall be chosen at a General Meeting of the Society. The Trustees are empowered to invest such sums as the Council may, from time to time, place in their hands, in, or upon any of the Stocks, Funds, or Securities, for the time being, authorised by statute for the investment of trust funds by trustees, and shall have the usual powers of trustees in regard thereto. [The President, Hon. Treasurer, and Hon.

Secretary may officially give effect to such resolutions as a General Meeting may pass in regard thereto.]

14*a*. All moneys received on account of the Institute shall be duly paid to its credit at the Bankers, and all cheques shall be drawn, under authority of the Council, and shall be signed by the Honorary Treasurer and Honorary Secretary.

15. The accounts shall be audited annually, by a Committee, consisting of two Members,—one of whom may be on the Council,—to be elected at an Ordinary Meeting of the Society preceding the Anniversary Meeting. This Committee shall make a written Report to the Council at the first Meeting after such audit, and also to the Institute, upon the day of the Annual General Meeting,—stating the balance in the Treasurer's hands and the general state of the funds of the Institute.

16. Both Members and Associates shall have the right to be present to state their opinion, and to vote by show of hands at all General and Ordinary Meetings of the Society; but Members only shall be entitled to vote by ballot, when a ballot is taken in order to determine any question at a General Meeting.

§ III. *Bye-Laws* (Privileges).

1. A Member or Associate, when elected, shall be so informed by the Secretary in a printed copy of the letters, Form B, in the Appendix.

2. Members and Associates shall not be entitled to any privileges, or have the right to be present, or to vote at any of the Meetings of the Society, till they have paid the contributions due by them.

3. Annual subscriptions shall be considered as in arrear, if not paid on or before 31st March in each year, or within three months after election, as the case may be.

4. Should any annual subscription remain in arrear to the 30th June, or for six months after election, the Treasurer shall cause to be forwarded to the Member or Associate from whom the subscription is due, a letter, Form D, in the Appendix, unless such Member or Associate reside out of the United Kingdom; in which case the Form D shall not be sent unless the subscription continues unpaid till the 30th September.

5. If any arrears be not paid within twelve months, the Council shall

use their discretion in erasing the name of the defaulter from the list of Members or Associates.

6. Members shall be entitled to introduce two Visitors at the Ordinary Meetings of the Society; and to have sent to them a copy of all the Papers read before the Society, which may be printed in its Transactions or otherwise, and of all other official documents which the Council may cause to be printed for the Society; they will also be entitled to a copy of all such translations of foreign works or other books as are published under the auspices of the Society in furtherance of Object 6 (§ I.).

7. Associates may introduce two Visitors at the Ordinary Meetings, and shall be entitled to all the minor publications of the Society, and to a copy of its Transactions during the period of their being Associates, but not to the translations of foreign works or other books above referred to.* It shall, however, be competent to the Council of the Society, when its funds will admit of it, to issue the other publications of the Society to Associates, being ministers of religion, either gratuitously or at as small a charge as the Council may deem proper.

8. When it shall be found necessary to send the letter, Form D, to any Member or Associate who may be in arrear, the printed papers and other publications of the Society shall cease to be sent to such Member or Associate till the arrears are paid; and, until then, he shall not be allowed to attend any Meeting of the Society, nor have access to any public rooms which may be in its occupation.

9. The Library† shall be under the management and direction of the Council, who are empowered to designate such works as shall not be allowed to circulate.

10. Each Member‡ shall be allowed to borrow books from the Library, and to have not more than three volumes in his possession at the same time; pamphlets and periodical publications not to be kept above fourteen days, nor any other book above three weeks.

11. Members who may borrow books from the Library shall be answerable for the full value of any work that is lost or injured.

---

* These, as well as the Transactions issued in the years previous to their joining, may be purchased at half price.

† For the use of Members and Associates.—*See 7th Object.*

‡ Members only are allowed to take books away.

12. Periodical publications shall remain on the table for a month other books for a fortnight, after they are received.

13. When a book or pamphlet is wanted, and has been the stipulated time in the possession of any Member, the Secretary shall request its return, and a fine of threepence a day shall be incurred for every day it may be detained, which fine shall commence on the third day after the transmission of the notice in the case of town Members, and after the sixth day in the case of country Members ; and until the return of such works, and the discharge of all fines incurred, no further issue of books shall be permitted to the Member applied to.

14. The books shall be ordered in for inspection at such times as the Council shall appoint, and a fine of half-a-crown shall be incurred for neglecting to send in books by the time required in the notice.

15. A book shall lie on the Library table in which Members may insert, for the consideration of the Council, the titles of such works as they desire to be purchased for the Institute.

§ IV. *Bye-Laws* (General, Ordinary, and Intermediate Meeting).

1. A General Meeting of Members and Associates shall be held annually on 24th May (being Her late Majesty's birthday, and the Society's anniversary), or on the Monday following, or on such other day as the Council may determine as most convenient, to receive the Report of the Council on the state of the Society, and to deliberate thereon ; and to discuss and determine such matters as may be brought forward relative to the affairs of the Society ; also, to elect the Council and Officers for the ensuing year.

2. The Council shall call a Special General Meeting of the Members and Associates, when it seems to them necessary, or when required to do so by requisition, signed by not less than ten Members and Associates, specifying the question intended to be submitted to such Meeting. Two weeks' notice must be given of any such Special General Meeting ; and only the subjects of which notice has been given shall be discussed thereat.

3. The Ordinary Meetings of the Society shall usually be held on the first and the Intermediate Meetings on the third Monday evenings in each month, from November to June inclusive or on such other evenings.

as the Council may determine to be convenient: and a printed card of the Meetings for each Session shall be forwarded to each Member and Associate.

4. At the Ordinary and Intermediate Meetings the order of proceeding shall be as follows: The President, or one of the Vice-Presidents, or a Member of the Council, shall take the chair at 4.30 o'clock precisely, the minutes of the last Ordinary or Intermediate Meeting shall be read aloud by one of the Secretaries, and, if found correct, shall be signed by the Chairman; the names of new Members and Associates shall be read; the presents made to the Society since their last Meeting shall be announced; and any other communications which the Council think desirable shall be made to the Meeting. After which, the Paper or Papers intended for the evening's discussion shall be announced and read, and the persons present shall be invited by the Chairman to make any observations thereon which they may wish to offer.

The claims of Members and Associates to take part in a discussion are prior to those of Visitors. The latter when desiring to speak upon any Paper, must first send their cards to the Chairman and ask permission (unless they have been specially invited by the Council "to attend, and join in considering the subject before the Meeting," or are called upon by the Chairman). 1875.

5. The Papers read before the Society, and the discussions thereon fully reported, shall be printed by order of the Council; or, if not, the Council shall, if they see fit, state the grounds upon which this Rule has been departed from, in the printed Journal or Transactions of the Society.

6. The Council may at their discretion authorise Papers of a general kind to be read at any of the Ordinary or Intermediate Meetings, either as introductory lectures upon subjects proper to be afterwards discussed, or as the results of discussions which have taken place, in furtherance of the 5th Object of the Society (§ I.).

7. With respect to Intermediate Meetings, the Papers read at which are not necessarily printed nor the discussions reported,* the Council at its discretion may request any lecturer or author of a Paper to be read thereat, previously to submit an outline of the proposed method of treating his subject.

---

* So arranged when the "Intermediate Meetings" were commenced, 16th January, 1871.

8. At the Ordinary or Intermediate Meetings no question relating to the Rules or General Management of the affairs of the Society shall be introduced, discussed or determined.

§ V. *Bye-Laws* (Council Meetings).

1. The Council shall meet at least once every month from November to June inclusive, or at any other time and on such days as they may deem expedient. The President, or any three Members of the Council, may at any time call a Special Meeting, to which the whole Council shall be summoned.

2. At Council Meetings three shall be a quorum ; the decision of the majority shall be considered as the decision of the Meeting, and the Chairman shall have a casting vote.

3. Minutes of the Proceedings shall be taken by one of the Secretaries, or, in case of his absence, by some other Member present, whom the Chairman may appoint ; which Minutes shall afterwards be entered in a minute-book kept for that purpose, and read at the next Meeting of the Council, when, if found correct, they shall be signed by the Chairman.

§ VI. *Bye-Laws* (Papers).

1. Papers presented to be read before the Society shall, when read, be considered as the property of the Society, unless there shall have been any previous engagement with its author to the contrary; and the Council may cause the same to be published in any way and at any time they may think proper after having been read. If a Paper be not read, it shall be returned to the author; and, if a Paper be not published within a reasonable time after having been read, the author shall be entitled himself to publish it, and he may borrow it for that purpose.

2. When a Paper is sent to the Society for the purpose of being read, it shall be laid before the Council, who shall refer it to two of that body, or of the other Members or Associates of the Society whom they may select, for their opinions as to the character of the Paper and its fitness or otherwise for being read before the Society, which they shall state as briefly as may be, in writing, along with the grounds of their respective opinions. Should one of such opinions be adverse to the Paper and against its being read before the Society, then it shall be referred to some other referee, who is unaware of the opinion already pronounced upon the Paper, in order that he may state his opinion upon it in like manner, Should this opinion be adverse to the Paper, the Council shall then

consult and decide whether the Paper shall be rejected or read ; and, if rejected, the Paper shall be returned to the author with an intimation of the purport of the adverse opinions which have been given with respect to it ; but the names of the referees are not to be communicated to him, unless with their consent or by order of the Council. All such references and communications are to be regarded as confidential, except in so far as the Council may please to direct otherwise.

3. The Council may authorise Papers to be read without such previous reference for an opinion thereon ; and when a Paper has been referred, and the opinion is in favour of its being read in whole or in part, the Council shall then cause it to be placed in the List of Papers to be so read accordingly, and the author shall receive due notice of the evening fixed for its reading.

4. The authors of Papers read before the Society shall, if they desire it, be presented with twenty-five separate copies of their Paper, with the discussion thereon, or with such other number as may be determined upon by the Council.

§ VII. *Bye-Laws* (General).

1. The government of the Society, and the management of its concerns are entrusted to the Council, subject to no other restrictions than are herein imposed, and to no other interference than may arise from the acts of Members in General Meeting assembled.

2. With respect to the duties of the President, Vice-Presidents, and other Officers and Members of Council, and any other matters not herein specially provided for, the Council may make such regulations and arrangements as they deem proper, and as shall appear to them most conducive to the good government and management of the Society, and the promotion of its objects. And the Council may hire apartments, and appoint persons not being Members of the Council, nor Members or Associates of the Institute, to be salaried officers, clerks, or servants, for carrying on the necessary business of the Society; and may allow them respectively such salaries, gratuities, and privileges, as to them, the Council, may seem proper ; and they may suspend any such officer, clerk or servant from his office and duties, whenever there shall seem to them occasion ; provided always, that every such appointment or suspension shall be reported by the Council to the next ensuing General Meeting of the Members to be then confirmed or otherwise as such Meeting may think fit.

FORM A.

FORM OF APPLICATION *for the Admission of Vice-Patrons, Members, or Associates of the* VICTORIA INSTITUTE.

[*Date*] _____ 19

*I hereby desire to be enrolled a** *of the* VICTORIA INSTITUTE, OR PHILOSOPHICAL SOCIETY OF GREAT BRITAIN,

* *Here insert* Vice-Patron, *or* Member, *or* Life Member, *or* Associate, *or* Life Associate.

Candidate's ordinary Signature, and full name, if necessary. _____

Title, Profession, University degree, &c., or other distinction. _____

Address _____

If an Author, the name of the Candidate's works may be here stated. _____

When filled this form is to be sent to the

Honorary Secretary of the VICTORIA INSTITUTE,
1, Adelphi Terrace House, Strand, London, W.C.

FORM B.

SIR, 19 .

I have the pleasure to inform you, with reference to your application dated the , that you have duly been elected a of the VICTORIA INSTITUTE, OR PHILOSOPHICAL SOCIETY OF GREAT BRITAIN.

I have the honour to be, Sir,
Your faithful Servant,

_____

To_____ *Sec.*

_____

FORM C.

(*Bankers*) Messrs._____

* Please pay Messrs. BARCLAY & Co., 1, Pall Mall East, S.W., my Annual Contribution of TWO GUINEAS to the VICTORIA INSTITUTE, due on the 1st of January, 19 , and the same amount on that day in every succeeding year, until further notice.

I am,
Your obedient Servant,

_____

_____19 .

If this Form be used, please add your Signature, Banker's Name, and the Date, and return it to the Office, 1, Adelphi Terrace House, W.C. Receipt-stamp required.

* The above is the form for Members. The form for Associates is the same except that the Subscription stands as "ONE GUINEA."

THE JOURNAL OF THE TRANSACTIONS

ISSUED DURING PAST YEARS.

Since the Inauguration of the Society, the following Papers have been read :— The Quarterly Parts of the Journal are indicated by the numbers prefixed. (*The volumes are sold at One Guinea to Non-Members; Half-a-Guinea to Members and Associates; those issued during the years of subscription are not charged for.*)

FIRST SERIES VOLS. 1 TO 5.

VOL. I.

1. A Sketch of the Existing Relations between Scripture and Science. By the ate GEORGE WARINGTON, Esq., F.C.S.
2. On the Difference in Scope between Scripture and Science. By the late C. MOUNTFORD BURNETT, Esq., M.D., Vice-President V.I.
   On Comparative Philology. By the Rev. ROBINSON THORNTON, D.D., Vice-President V.I.
   On the Various Theories of Man's Past and Present Condition. By the late JAMES REDDIE, Esq., Hon. Sec. V.I.
3. On the Language of Gesticulation and Origin of Speech. By Professor J. R. YOUNG.
   On Miracles: their Compatibility with Philosophical Principles. By the Rev. W. W. ENGLISH, M.A.
   Thoughts on Miracles. By the late E. B. PENNY, Esq.
   On the General Character of Geological Formations. By the late E. HOPKINS, Esq., C.E.
4. On the Past and Present Relations of Geological Science to the Sacred Scriptures. By the Rev. Professor JOHN KIRK.
   On the Lessons taught us by Geology in relation to God. Rev. J. BRODIE, M.A.
   On the Mutual Helpfulness of Theology and Natural Science. By Dr. GLADSTONE, F.R.S.
   On Falling Stars and Meteorites. By the late Rev. W. MITCHELL, M.A., Vice-President V.I.
   (*The above Papers, with the Discussions thereon, and with "Scientia Scientiarum: being some Account of the Origin and Objects of the Victoria Institute," with the Reports of the Provisional Proceedings, and the Inaugural Address by the late Rev. Walter Mitchell, M.A., Vice-President, form Vol. I. of the "Journal."*)

VOL. II.

5. On the Terrestrial Changes and Probable Ages of the Continents, founded upon Astronomical Data and Geological Facts. By the late EVAN HOPKINS, Esq., C.E., F.G.S.
   On the Credibility of Darwinism. By the late GEORGE WARINGTON, Esq., F.C.S.
   On the Credibility of Darwinism. By the late JAMES REDDIE, Esq., Hon. Sec. V.I.
6. On Utilitarianism. By the late JAMES REDDIE, Esq., Hon. Sec. V.I.
   On the Logic of Scepticism. By the Rev. ROBINSON THORNTON, D.D., V.P.
   Annual Address (On the Institute's Work). By the late JAMES REDDIE, Esq., Hon. Sec. V.I.
7. On the Relations of Metaphysical and Physical Science to the Christian Doctrine of Prayer. By the Rev. Professor JOHN KIRK.
   On Geological Chronology, and the Cogency of the Arguments by which some Scientific Doctrines are supported. (In reply to Professor Huxley's Address delivered at Sion College on 21st Nov., 1867.) By the late J. REDDIE, Esq., Hon. Sec. V.I. (1867–68).
8. On the Geometrical Isomorphism of Crystals, and the Derivation of all other Forms from those of the Cubical System. (*6 Plates.*) By the late Rev. W. MITCHELL, M.A., V.P

VOL. III.

9. On the Antiquity of Civilisation. By the late Bishop TITCOMB, D.D.
   On Life, with some Observations on its Origin. By J. H. WHEATLEY, Esq., Ph.D.
   On the Unphilosophical Character of some Objections to the Divine Inspiration of Scripture. By the late Rev. WALTER MITCHELL, M.A.
   On Comparative Psychology. By E. J. MORSHEAD, Esq., Hon. For. Sec. V.I.
10. On Theology as a Science. By the late Rev. A. DE LA MARE, M.A.
    On the Immediate Derivation of Science from the Great First Cause. By R. LAMING, Esq.
    On some of the Philosophical Principles contained in Mr. Buckle's "History of Civilisation," in reference to the Laws of the Moral and Religious Developments of Man. By the Rev. Prebendary C. A. ROW, M.A.
    On the Nature of Human Language, the Necessities of Scientific Phraseology, and the Application of the Principles of both to the Interpretation of Holy Scripture. By the Rev. J. BAYLEE, D.D.
11. On the Common Origin of the American Races with those of the Old World. By the late Bishop TITCOMB, D.D.
    On the Simplification of first Principles in Physical Science. By the late C. BROOKE, F.R.S.
    On the Biblical Cosmogony scientifically considered. By late G. WARINGTON, Esq., F.C.S.
    On Ethical Philosophy. By the Rev. W. W. ENGLISH, M.A.
12. On some Uses of Sacred Primeval History. By the late D. MCCAUSLAND, Esq., Q.C., LL.D.
    On the Relation of Reason to Philosophy, Theology, and Revelation. By the Rev. Preb. C. A. ROW, M.A.

VOL. IV.

13. Analysis of Human Responsibility. By the late Prebendary IRONS, D.D. (And part 16.)
    On the Doctrine of Creation according to Darwin, Agassiz, and Moses. By Prof. KIRK.
14. On the Noachian Deluge. By the Rev. M. DAVISON.
    On Life—Its Origin. By J. H. WHEATLEY, Esq., Ph.D.
    On Man's Place in Creation. By the late Professor MACDONALD, M.D.
15. On More than One Universal Deluge recorded in Scripture. By late Rev. H. MOULE, M.A.
    On Certain Analogies between the Methods of Deity in Nature and Revelation. By the Rev. G. HENSLOW, M.A., F.L.S.
    On the Respective Provinces of the Observer and the Reasoner in Scientific Investigation. By the Rev. EDWARD GABBETT, M.A.
    On the Credulity of Scepticism. By the Rev. R. THORNTON, D.D., V.P.
16. On Current Physical Astronomy. By the late J. REDDIE, Esq., Hon. Sec. V.I.
    Analysis of Human Responsibility. By the late Preb. IRONS, D.D. (See part 13.) *Concluded.*

VOL. V.

17. On the Origin of the Negro. By the late Bishop TITCOMB, D.D.
    On the Testimony of Philosophy to Christianity as a Moral and Spiritual Revelation. By the Rev. Preb. C. A. ROW, M.A.
    On the Numerical System of the Old Testament. By the Rev. Dr. THORNTON, V.P.
18. On Spontaneous Generation; or, the Problem of Life. By the Rev. Prof. KIRK.
    A Demonstration of the Existence of God. By the Rev. J. M'CANN, D.D.
    Why Man must Believe in God. By the late JAMES REDDIE, Esq., Hon. Sec. V.I.
19. On Geological Proofs of Divine Action. By S. R. PATTISON, Esq., F.G.S.
    On True Anthropology. By W. HITCHMAN, Esq., M.D.
    On Comparative Psychology. (Second Paper.) By E. J. MORSHEAD, Esq., Hon. For. Sec. V.I.
20. On the High Numbers in the Pentateuch. By P. H. GOSSE, Esq., F.R.S., V.P.
    Israel in Egypt. By the late Rev. H. MOULE, M.A.

NEW SERIES.

Being the Volumes containing the more Modern Papers.

VOL. VI. is the First of this Series.

21. On Civilisation, Moral and Material. (Also in Reply to Sir John Lubbock on "Primitive Man.") By the late J. Reddie, Esq., Hon. Sec. V.I.
22. On Dr. Newman's "Essay in Aid of a Grammar of Assent." By the Rev. Preb. Row, M.A.
On the Evidence of the Egyptian Monuments to the Sojourn of Israel in Egypt. By the Rev. B. W. Savile, M.A.
On the Moabite Stone. By Captain F. Petrie, Hon. Sec.
On Phyllotaxis; or, the Arrangement of Leaves in Accordance with Mathematical Laws. By the Rev. G. Henslow, M.A., F.L.S.
On Prehistoric Monotheism, considered in relation to Man as an Aboriginal Savage. By the late Bishop Titcomb, D.D.
23. On Biblical Pneumatology and Psychology. By the Rev. W. W. English, M.A.
On Some Scriptural Aspects of Man's Tripartite Nature. By the Rev. C. Graham.
On Ethnic Testimonies to the Pentateuch. By the late Bishop Titcomb, D.D.
24. On the Darwinian Theory. By the late Prebendary Irons, D.D.
Serpent Myths of Ancient Egypt. By the late W. R. Cooper, Esq., F.R.A.S., M.R.A.S., Sec. Soc. Biblical Archæology. 129 Illustrations.

VOL. VII.

25. On Natural Theology, considered with respect to Modern Philosophy. By the Rev. G. Henslow, M.A., F.L.S.
On Fatalism. Contributed by the Rev. J. Robbins, D.D.
26. On Darwinism Tested by Recent Researches in Language. By F. Bateman, Esq., M.D., &c.
On Force and its Manifestations. By the Rev. J. M'Cann, D.D.
On Professor Tyndall's "Fragments of Science for Unscientific People." By the late Prebendary Irons, D.D.
On the Origin of the Moral Sense. By the Rev. Professor Kirk.
On Force and Energy. By the late Charles Brooke, Esq., M.A., F.R.S.
27. On Darwinism and its Effects upon Religious Thought. By C. R. Bree, Esq., M.D., &c.
Remarks on Some of the Current Principles of Historic Criticism. By Rev. Preb. Row, M.A.
On "Scientific Facts and Christian Evidence." By the late J. E. Howard, Esq., F.R.S., F.L.S.
28. On the "Law of Creation—Unity of Plan, Variety of Form." By Rev. G. W. Weldon, M.A.
Some Remarks on the Present Aspect of Inquiries as to the Introduction of Genera and Species in Geological Time. By V.-Chancellor J. W. Dawson, C.M.G., LL.D., F.R.S.

VOL. VIII.

29. The Palæolithic Age Examined. By N. Whitley, Esq.
(Annual Address.) On the Moral and Social Anarchy of Modern Unbelief. By the late Principal T. P. Boultbee, LL.D.
30. On the Identity of Reason in Science and Religion. Rev. R. Mitchell.
On Buddhism. By the Right Rev. Bishop Piers C. Claughton, D.D., &c., with communications from Professors Chandler and Brewer.
On the Contrast between Crystallisation and Life. By the late J. E. Howard, Esq., F.R.S.
31. On the Brixham Cavern and its Testimony to the Antiquity of Man—examined. By N. Whitley, Esq., Sec. Royal Inst. of Cornwall.
On the Rules of Evidence as applicable to the Credibility of History. By W. Forsyth, Esq., Q.C., LL.D., Vice-President.
On the Principles of Modern Pantheistic and Atheistic Philosophy as expressed in the last work of Strauss, Mill, &c. By the Rev. Prebendary C. A. Row, M.A. Paper on the same, by late Prof. Challis, M.A., F.R.S., F.R.A.S.
32. On Prehistoric Traditions and Customs in Connexion with Sun and Serpent Worship. By J. S. Phene, Esq., LL.D., F.S.A., with Illustrations.

VOL. IX.

33. On the Varying Tactics of Scepticism. (Annual Address.) By the Rev. Robinson Thornton, D.D., Vice-President.
On the Harmony between the Chronology of Egypt and the Bible. By the Rev. B. W. Savile, M.A.
On the Ethical Condition of the Early Scandinavian Peoples. By E. W. Gosse, Esq.
34. On Magnitudes in Creation and their Bearings on Biblical Interpretation. By the late Bishop Titcomb, D.D. Paper on the same, by late Prof. Challis, M.A., F.R.S., F.R.A.S.; with communications from the Astronomer Royal's Department, the Radcliffe Observer, and Professor Pritchard, F.R.S.
On Biblical Interpretation in connexion with Science. By the Rev. A. I. McCaul, M.A. (King's College), with a communication by V.-Chancellor J. W. Dawson, C.M.G., LL.D., F.R.S.
On the Final Cause as Principle of Cognition and Principle in Nature. By Professor G. S. Morris, of Baltimore University, U.S.
35. On the Bearing of certain Palæontological Facts upon the Darwinian Theory of the Origin of Species, and of Evolution in General. By Professor H. A. Nicholson, M.D., D.Sc., F.R.S.E., &c.
On the Early Dawn of Civilisation, considered in the Light of Scripture. By the late J. E. Howard, Esq., F.R.S.
On the Indestructibility of Force. By the late Professor Birks, M.A.
36. On Mr. Mill's Essays on Theism. By the late Preb. W. J. Irons, D.D.

VOL. X.

37. On the Chronology of Recent Geology. By S. R. Pattison, Esq., F.G.S.
On the Nature and Character of Evidence for Scientific Purposes. By the Rev. J. M'Cann, D.D.
The Relation of the Scripture Account of the Deluge to Physical Science. By the late Prof. Challis, M.A., F.R.S., F.R.A.S.
38. An Examination of the Belfast Address from a Scientific point of view. By the late J. E. Howard, Esq., F.R.S.
Annual Address: Modern Philosophic Scepticism examined. By the late Rev. R. Main, F.R.S., V.P.R.A.S., *The Radcliffe Observer*.
On the Etruscan Language. By the Rev. Isaac Taylor, M.A.
39. On "Present Day Materialism." By the Rev. J. McDougall.
On the Sorrows of Scepticism. By Rev. R. Thornton, D.D., Vice-Pres. (*see* parts 6, 15, 33.)
On Heathen Cosmogonies, compared with the Hebrew. By Rev. B. W. Savile, M.A.
On the Place of Science in Education. By Professor H. A. Nicholson, M.D., D.Sc., F.R.S.E.
40. On Egypt and the Bible. By the late J. E. Howard, Esq., F.R.S.

VOL. XI.

41. The Flint "Implements" of Brixham Cavern. By N. Whitley, Esq. (*Photographically illustrated.*)
On the Flint Agricultural Implements of America. By Dr. J. W. Dawson, C.M.G., F.R.S.
An Examination of "The Unseen Universe." By the late Preb. Irons, D.D.
The Uncertainties of Modern Physical Science. By the late Professor Birks, M.A.
The Ethics of Belief. By Principal H. Wace, D.D.
42. On the Metaphysics of Scripture. By the late Prof. Challis, M.A., F.R.S., F.R.A.S.
On the Theory of Unconscious Intelligence as opposed to Theism. By Prof. Morris, U.S.A.
On the Myth of Ra. By the late W. R. Cooper, Esq., F.R.A.S., Sec. Soc. Bib. Arch.
On Christianity as a Moral Power. By Professor Lias, Hulsean Lecturer, Cambridge.
43. On the Structure of Geological Formations as Evidence of Design. By D. Howard, F.C.S
On the Bible and Modern Astronomy. By the late Prof. Birks, M.A. (Camb.).
44. On Comparative Psychology. By E. J. Morshead, Esq.

VOL. XII.

45. On the Indestructibility of Matter. By the late Professor Challis, M.A., F.R.S., F.R.A.S.
On History in the Time of Abraham, Illustrated by Recent Researches. By Rev. H. G. Tomkins. With Numerous Notes by Various Assyriologists.
On the Horus Myth. By the late W. R. Cooper, Esq., F.R.A.S., M.R.A.S., Sec. Soc. Bib. Arch. (*Illustrated.*) Additional Papers by various Egyptologists.
46. The Influence of True and False Philosophy. (Ann. Address.) The late J. E. Howard, F.R.S.
The History of the Alphabet. By Rev. Isaac Taylor, M.A.
Creation and Providence. By the late J. E. Howard, Esq., F.R.S.
Nature's Limits: an Argument for Theism. By S. R. Pattison, Esq., F.G.S.
Mr. Matthew Arnold and Modern Culture. Prof. Lias, Hulsean Lecturer, Cambridge.

47. On the Relation of Scientific Thought to Religion. The Right Rev. Bishop COTTERILL, D.D.
Monotheism. By the Rev. Dr. RULE (Author of "Oriental Records").
48. Physical Geography of the East. By the late J. L. PORTER, D.D., D.C.L.

VOL. XIII.

49. Modern Geogenies and the Antiquity of Man. Late Prof. BIRKS, M.A.
The Annual Address. Rev. Principal RIGG, D.D.
50. "On Science and Man." By Dr. NOAH PORTER (President of Yale, United States).
"The Lapse of Time since the Glacial Epoch determined by the Date of the Polished Stone Age." By Dr. SOUTHALL (United States).
"Final Cause: a Critique of the Failure of Paley and the Fallacy of Hume." By the late J. P. THOMPSON, D.D., LL.D. (Harvard, U.S.).
51. "The Torquay Caves and their Teachings." By the late J. E. HOWARD, Esq., F.R.S.
"Does the Contemporaneity of Man with the Extinct Mammalia, as shown by Recent Cavern Exploration, prove the Antiquity of Man?" By T. K. CALLARD, Esq., F.G.S., &c.; with special additional communications by Professor BOYD-DAWKINS, F.R.S., Rev. J. M. MELLO, M.A., F.G.S. (Creswell), &c.
"The System of Zoroaster considered in connexion with Archaic Monotheism." By R. BROWN, Esq., F.S.A.
52. "On the Evidence already obtained as to the Antiquity of Man." By Professor T. McK. HUGHES, M.A. (Woodwardian Professor of Geology at Cambridge University); with additions by the DUKE OF ARGYLL, K.G., Professor BOYD-DAWKINS, F.R.S., and other Geologists.

VOL. XIV.

53. "The Topography of the Sinaitic Peninsula" (giving results of last survey). By (the late) Rev. F. W. HOLLAND, M.A. (Palestine Exploration Fund); with a new map.
"The Ethnology of the Pacific." By the Rev. S. J. WHITMEE, F.L.S.; with a large new map, showing the distribution of Races and all the results of the latest discoveries.
The Annual Meeting.
54. On Physiological Metaphysics. By Professor NOAH PORTER (President, Yale Univ., U.S.).
On the Druids and their Religion. By the late J. E. HOWARD, Esq., F.R.S.
On the Organ of Mind. By Rev. J. FISHER, D.D. (the late).
On the Data of Ethics. By Principal WACE, D.D.
55. On the Bearings of the Study of Natural Science, and of the Contemplation of the Discoveries to which that Study leads, on our Religious Ideas. By Professor STOKES, P.R.S. (Lucasian Professor of Mathematics, Cambridge).
Late Assyrian and Babylonian Research. By HORMUZD RASSAM, Esq.
On the Evidence of the Later Movements of Elevation and Depression in the British Isles. By Professor HUGHES, M.A. (Woodwardian Professor of Geology at Cambridge).
On the Nature of Life. By Professor H. A. NICHOLSON, M.D., F.R.S.E., Aberdeen.
56. On the Religion and Mythology of the Aryans of Northern Europe. By R. BROWN, F.S.A.

VOL. XV.

57. The Life of Joseph. Illustrated from Sources External to Holy Scripture. By Rev. H. G. TOMKINS.
On the Relation between Science and Religion, through the Principles of Unity, Order, and Causation. Annual Address by the Right Rev. Bishop COTTERILL, D.D. (the late).
Some Considerations on the Action of Will in the Formation and Regulation of the Universe—being an Examination and Refutation of certain Arguments against the existence of a personal conscious Deity. By (the late) Lord O'NEILL.
58. On the Modern Science of Religion, with Special Reference to those parts of Prof. Max Müller's "Chips from a German Workshop," which treat thereon. Rev. G. BLENCOWE.
On the Early Destinies of Man. By (the late) J. E. HOWARD, Esq., F.R.S.
Pliocene Man in America. By Dr. SOUTHALL (United States); a second paper on the same, by Sir J. W. DAWSON, C.M.G., LL.D., F.R.S., of M'Gill College, Montreal; and communications from the Duke of ARGYLL, K.G.; Professor W. BOYD-DAWKINS, F.R.S.; Professor T. McK. HUGHES (Woodwardian Professor of Geology at Cambridge), and others.
59. Scientific Facts and the Caves of South Devon. By (the late) J. E. HOWARD, Esq., F.R.S.
Implements of the Stone Age as a primitive Demarcation between Man and other Animals. By (the late) J. P. THOMPSON, D.D., LL.D.
Meteorology: Rainfall. By J. F. BATEMAN, Esq., F.R.S., F.R.S.E.
On the Rainfall and Climate of India. By Sir JOSEPH FAYRER, K.C.S.I., M.D., F.R.S., with a new Map, showing the Physical Geography and Meteorology of India, by TRELAWNEY W. SAUNDERS, Esq.
60. Language and the Theories of its Origin. By R. BROWN, Esq., F.S.A.

VOL. XVI.

61. The Credibility of the Supernatural. (Annual Address.) By (the late) Lord O'NEILL.
Supposed Palæolithic Tools of the Valley of the Axe. By N. WHITLEY, Esq. (Engravings.)
An Examination of the Philosophy of Mr. Herbert Spencer. By the Rev. W. D. GROUND.
62. On Herbert Spencer's Theory of the Will. By Rev. W. D. GROUND; with Communication.
Biblical Proper Names, personal and local, illustrated from sources external to Holy Scripture. By Rev. H. G. TOMKINS. Comments by Professor MASPERO, Mr. RASSAM, and others.
Breaks in the Continuity of Mammalian Life at certain Geological Periods, fatal to the Darwinian Theory of Evolution. By (the late) T. K. CALLARD, Esq., F.G.S., with Comments by several Geologists.
The New Materialism Unscientific; or, Dictatorial Scientific Utterances and the Decline of Thought. By Professor LIONEL S. BEALE, M.D., F.R.S.
On the Living and the Non-Living. By the same. On the New Materialism. By the same.
63. The Theory of Evolution taught by Hæckel, and held by his followers. By J. HASSELL, Esq.
The Supernatural in Nature. By (the late) J. E. HOWARD, Esq., F.R.S.
64. Materialism. By Judge C. W. RICHMOND.

VOL. XVII.

65. The Recent Survey of Western Palestine, and its Bearing upon the Bible. By TRELAWNEY SAUNDERS, Esq.
Remarks on Climate in relation to Organic Nature. By Surgeon-General C. A. GORDON, M.D., C.B. Speeches by Sir J. RISDON BENNETT, V.P.R.S.; Sir JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.; and others.
66. On the Argument from Design in Nature, with some Illustrations from Plants. By (the late) W. P. JAMES, Esq., M.A.
Considerations on the Unknown and Unknowable of Modern Thought; or, Is it possible to know God? By the Rev. J. J. LIAS, M.A. (then Hulsean Lecturer). Comments by (the late) Lord O'NEILL and others.
On certain Theories of Life. By Surg.-Gen. C. A. GORDON, C.B., M.D., Hon. Phys. to the Queen.
67. On Certain Definitions of Matter. By (the late) J. E. HOWARD, Esq., F.R.S.
On the Absence of Real Opposition between Science and Revelation. By Professor G. G. STOKES, P.R.S. Comments by several leading scientific men.
Babylonian Cities. By HORMUZD RASSAM; with Remarks by Professor DELITZSCH, &c.
68. The Origin of Man. By Archdeacon BARDSLEY.
Did the World Evolve Itself? By Sir E. BECKETT, Bart. (now Lord Grimthorpe).

VOL. XVIII.

69. On Misrepresentations of Christianity. By Lord O'NEILL (the late).
Science not opposed to Revelation. By J. L. PORTER, D.D., D.C.L. (the late).
70. Recent Egyptological Research in its Biblical Relation. By the Rev. H. G. TOMKINS.
Cuneiform Inscriptions as illustrative of the times of the Jewish Captivity. By W. ST. CHAD BOSCAWEN, F.R.Hist.Soc.
Nebuchadnezzar, King of Babylon—On Recently Discovered Inscriptions of this King. By E. A. BUDGE, M.A., M.R.A.S.
Buddhism. By Rev. R. COLLINS. Remarks by Dr. LEITNER (Lahore), Professor RHYS DAVIDS, Mr. RASSAM, Rev. S. COLES (Ceylon), &c. Also a full Note on Krishna.
71. Pessimism. By (the late) W. P. JAMES, Esq.
On the Prehistoric Factory of Flints at Spiennes. By Rev. J. MAGENS MELLO, F.G.S.
The Evolution of the Pearly Nautilus. By S. R. PATTISON, Esq., F.G.S.
72. "On Prehistoric Man in Egypt and the Lebanon." By Sir J. W. DAWSON, C.M.G., F.R.S., McGill University, Montreal. Remarks by Professors W. WARINGTON SMYTH, F.R.S., W. BOYD-DAWKINS, F.R.S., T. RUPERT JONES, F.R.S., T. WILTSHIRE, F.G.S., Colonel HERSCHEL, F.R.S., Dr. RAE, F.R.S.

VOL. XIX.

73. On the Inductive Logic. By Prof. R. L. DABNEY, D.D., LL.D. Speeches by Sir H. BARKLY, G.C.M.G., K.C.B., F.R.S., Sir J. LEFROY, K.C.M.G., F.R.S., &c.
On Evolution by Natural Selection. By J. HASSELL, Esq.
Remarks on Evolution. By Professor VIRCHOW.
74. On the Recency of the Close of the Glacial Epoch. By D. MACKINTOSH, Esq., F.G.S. Communications from Prof. T. RUPERT JONES, F.R.S., and others.
On the recession of Niagara (with the United States Government Survey Diagrams).

On the Religion of the Aboriginal Tribes of India. By Professor J. Avery. Remarks by General Haig, Mr. E. Rassam, and others.
On the Evolution of Savages by Degradation. By Rev. F. A. Allen, M.A.
Some Thoughts on the Evolution of Religions. By Rev. W. R. Blackett, M.A.
On the Relation of Fossil Botany to Theories of Evolution. By late W. P. James, F.L.S.
75. Remarks by Sir R. Owen, F.R.S., Prof. W. Carruthers, F.R.S., Dr. J. Braxton Hicks, F.R.S., &c.
Was Primeval Man a Savage? By J. Hassell, Esq.
Remarks on Evolution and Development. By Rev. J. White, M.A.
On Some Characteristics of Primitive Religions. By Rev. R. Collins, M.A.
Human Responsibility. By Rev. G. Blencowe.
76. On the Worship and Traditions of the Aborigines of America. By Rev. M. Eells, M.A.
Remarks by Professor J. O. Dorsey, U.S. Survey.
Note on Comparative Religions.

VOL. XX.

77. Special Address by the Institute's President, Sir G. G. Stokes, Bart., M.A., D.C.L., President of the Royal Society.
Egypt: Physical, Historical, Literary, and Social. By J. Leslie Porter, D.D., D.C.L. (the late). Remarks by the Earl of Belmore, Right Hon. A. S. Ayrton (the late), &c.
On the Theory of Natural Selection and the Theory of Design. By Professor Duns, D.D., F.R.S.E. Remarks by Right Hon. Lord Grimthorpe, &c.
78. On Agnosticism. By J. Hassell, Esq.
On the Structure of the Gorilla. By E. Charlesworth, Esq., F.G.S.; with illustration.
Notes on the Antiquity of Man. By the Editor. The Chronology of Animal Life on the Earth prior to the Advent of Man. By Sir J. William Dawson, C.M.G., F.R.S., President of the British Association.
Historical Evidences of the Migration of Abram. By W. St. C. Boscawen, F.R.Hist.Soc., with drawings. Notes by Professor Sayce, E. A. W. Budge, Esq., &c.
A Samoan Tradition of Creation. Rev. T. Powell, F.L.S. (the late); Notes on the Islanda.
79. The Fundamental Assumptions of Agnosticism. By Rev. H. J. Clarke.
On Miracles. By Rev. H. C. M. Watson. Remarks by Lord Grimthorpe, &c.
On Accounts of the Creation. By W. P. James, Esq., F.L.S. (the late).
80. On Final Cause. By Professor R. L. Dabney, D.D., LL.D.
On Structure and Structureless. By Prof. Lionel S. Beale, M.B., F.R.S.
On the Meteorology of Syria and Palestine. By Professor G. E. Post, F.L.S. (with chart). Remarks by Sir Joseph Fayrer, K.C.S.I., F.R.S., &c.
On the Geographical Names on the List of Thothmes III. By Professor G. Maspero (with map). Remarks by Sir Charles Wilson, K.C.B., K.C.M.G., F.R.S., Major C. R. Conder, R.E., Dr. Wright, &c. Note on Excavations round the Sphinx. By Prof. Maspero.

VOL. XXI.

81. Results of an Expedition to Arabia Petræa and Palestine (with chart). By Professor E. Hull, F.R.S., Director of the Geological Survey of Ireland.
Jewish, Phœnician, and Early Greek Art. By Rev. J. Leslie Porter, D.C.L. (the late).
82. The Discoveries at Sidon.
The Empire of the Hittites. By Rev. W. Wright, D.D. Note on the Hittites.
Canaan, Ancient and Modern. By Professor Tristram, F.R.S.
On Caves. By Professor T. McK. Hughes, F.R.S. (Cambridge), with comments by Sir J. W. Dawson, C.M.G., F.R.S., Sir Warington W. Smyth, F.R.S., and others.
Oriental Entomology. By Rev. F. A. Walker, D.D., F.L.S. Notes by S. T. Klein, Esq., F.L.S., and others.
Petra. By Professor E. Hull, F.R.S. (with chart).
83. On Krishna. By Rev. R. Collins, M.A. Notes by Sir M. Monier-Williams, K.C.I.E., Professors Max Muller, E. B. Cowell, Douglas, de Lagouperie, Dr. Leitner, and Dr. Edersheim (the late).
The Pedigree of the Coral Reefs of England. By S. R. Pattison, F.G.S. Remarks by Sir G. G. Stokes, Bart., P.R.S.
Practical Optimism. By the Most Rev. Bishop Saumarez Smith, D.D.
84. Traditions of the Aborigines of North America. By Rev. S. D. Peet (with illustrations).
On the Beauty of Nature. By Lord Grimthorpe, with special paper by Rev. W. Arthur, M.A.
Evolution. By Rev. H. J. Clarke, M.A. Remarks by Sir J. W. Dawson, C.M.G., F.R.S.
Appendices; The Jewish Nation and Diseases. Egyptian Discoveries in 1888. (Library List, &c.) The Sacred Books of the East. By Sir M. Monier-Williams, K.C.I.E.

VOL. XXII.

85. Annual Address by the President, Sir G. G. Stokes, Bart., M.P., President of the Royal Society. Speeches by Sir H. Barkly, K.C.B., F.R.S., Sir Risdon Bennett, F.R.S., Sir F. L. McClintock, F.R.S., Mr. H. Rassam, &c.
Note by the President on the one Origin of the Books of Revelation and of Nature.
On Time and Space. By the Rev. W. Arthur.

86. On the Names on the List of Thothmes III at Karnac, their Geographical, Ethnographical, and Biblical relations. By G. Maspero, with communications from Sir C. Wilson, K.C.B., F.R.S., Professor A. H. Sayce, Rev. Canon Liddon, Mr. Le Page Renouf, Rev. Dr. Edersheim, Major C. R. Conder, Rev. H. G. Tomkins, &c., with maps by G. Maspero.
On the Theory of Natural Selection and the Theory of Design. By Professor Duns, D.D., with remarks by Lord Grimthorpe, the Most Rev. the Bishop of Sydney, and others, and a note by Mr. T. Francis Rivers, F.L.S.
On the late Professor Asa Gray. By the Editor.
Note on the importance of Babylonian Excavations. By the Editor
On Human Footprints in Nicaragua. By Dr. D. G. Brinton.

87. The Aborigines of Australia, their Ethnic Position and Relations, by J. Fraser, LL.D., F.R.S. (N.S.W.), with remarks by many travellers; also an opinion by Professor Max Müller.
Oriental Entomology. By Rev. F. A. Walker, D.D., F.L.S., remarks by several entomologists, including a note by Mr. E. B. Poulton, F.R.S., on Mimicry.

88. A Physical Theory of Moral Freedom. By Joseph John Murphy; remarks by Sir J. Fayrer, K.C.S.I., F.R.S., the Hon. J. M. Gregory, LL.D., of Washington, and others.
The Botanical Geography of Syria and Palestine. By Professor G. E. Post, D.D., M.D., with notes by Eastern Travellers.
On Flint Arrow Heads of delicate Structure. By the Rt. Hon. Sir C. Murray, K.C.B., also a note on Cave Deposits.

VOL. XXIII.

89. Annual Address by Sir M. Monier-Williams, K.C.I.E., D.C.L., LL.D., Ph.D., Boden Professor of Sanscrit in Oxford University. Speeches by the Bishop of Dunedin, Sir H. Barkly, G.C.M.G., K.C.B., Sir Risdon Bennett, F.R.S., late Mr. H. W. Bristow, F.R.S., &c.
On a few of the Contrasts between the Essential Doctrines of Buddhism and of Christianity. By Sir M. Monier-Williams, K.C.I.E., &c., &c.
Coral Islands and Savage Myths. By H. B. Guppy, Esq., M.B. Discussion, &c., by Sir G. G. Stokes, Bart., M.P., P.R.S., Captain W. J. L. Wharton, R.N., F.R.S., the Hydrographer to the Admiralty, Mr. W. H. Hudleston, F.R.S., Professor James Geikie, F.R.S., Mr. John Murray, of the *Challenger* Expedition, &c.
On the Keeling Atoll. By Dr. Guppy.

90. Colours in Nature. By Rev. F. A. Walker, D.D., F.L.S.
On the Sciences of Language and of Ethnography. By Dr. Leitner, Ph.D., LL.D., D.O.L.
Modern Science and Natural Religion. By Rev. C. Godfrey Ashwin, M.A.
Note on Science and Religion. By Captain F. Petrie, F.G.S.
The Historical Results of the Excavations at Bubastis. By E. Naville, Ph.D. Remarks by Sir C. Newton, K.C.B., Dr. Reginald Stuart Poole, &c.

91. Notes on the Ethnology and Ancient Chronology of China. By Surgeon-General Gordon, M.D., C.B. Remarks by Dr. Legge, Prof. Chinese, Oxford Univ., Dr. Beal, Prof. Chinese, London Univ., &c.
On Cuts on Bone as evidence of Man's Existence in remote ages. By Prof. T. McK. Hughes, F.R.S. Remarks by Prof. Rupert Jones, F.R.S., Prof. A. S. Woodward, F.G.S., Rev. J. M. Mello, M.A., F.G.S., &c.
The Butterflies and Moths of Africa. By W. F. Kirby, F.E.S.

92. The Factors of Evolution in Language. By Mr. J. J. Murphy. Remarks by Professor Max Müller.
The Meaning and History of the Logos of Philosophy. By Rev. H. J. Clarke.
The Dawn of Metallurgy. By Rev. J. Magens Mello, M.A., F.G.S. Remarks by Professor Sayce, Major Conder, Mr. J. Allen Brown, F.G.S., and others.

VOL. XXIV.

93. Annual Meeting. The Cuneiform Inscriptions of Tel el Amarnâ. By the Rev. A. H. Sayce, M.A., D.D., LL.D., Professor of Assyriology, Oxford University. Speeches by the Rt. Hon. Lord Halsbury, Lord High Chancellor, Dr. Naville, Sir H. Barkly, K.C.B., F.R.S., &c., Sir E. Ommanney, C.B., F.R.S., Sir J. Risdon Bennett, F.R.S., Captain E. W. Creak, R.N., F.R.S., and others.
On the Canaanites. By Major C. R. Conder, R.E., D.C.L.

94. Instinct and Reason. By C. Collingwood, Esq., M.A., M.B., M.R.C.P., F.L.S., &c. Remarks by Professor Hull, F.R.S., and others.
The Science of Rectitude as Distinct from Expedience. By Rev. H. J. Clarke.
God in Nature. By Professor E. Hull, D.C.L., F.R.S., Director of the Geological Survey of Ireland.
Man's Place in Nature. A Note. By the Editor.

95. Land Tenure in Ancient Times in Palestine. By Rev. J. Neil, M.A. Remarks by the Right Hon. Lord Halsbury, Lord High Chancellor, Mr. F. Seebohm, Mr. S. Bergheim, Dr. Chaplin, and other Eastern Travellers.
The Botany and Entomology of Iceland. By Rev. F. A. Walker, D.D., F.L.S. Remarks by Dr. J. Rae, F.R.S., Dr. G. Harley, F.R.S., Professor Logan Lobley, F.G.S., &c.
The Origin of Man. An address thereon by Professor Rudolph Virchow.

96. The Dispersal of Plants as Illustrated by the Flora of the Keeling Islands. By H. B. Guppy, Esq., M.B. Remarks thereon by Professor T. Rupert Jones, F.R.S., Mr. John Murray (*Challenger* Expedition), and others.
Sketch of the Geological History of Egypt and the Nile Valley. By Professor E. Hull, LL.D., F.R.S., F.G.S., &c., with map.

VOL. XXV.

97. The Monism, Pantheism, and Dualism of Brahmanical and Zoroastrian Philosophers. By Sir M. Monier-Williams, K.C.I.E., D.C.L.
On the Post Glacial Period. By Professor W. Upham, Assistant State Geologist, U.S.A. (a note).
On Human Responsibility. By the Right Hon. Lord Grimthorpe. Remarks by Prebendary H. Wace, D.D., Principal of King's College, London.

98. Chinese Chronology. By Professor J. Legge, M.A., Oxford University. Remarks by Sir Thomas Wade, G.C.M.G., and others.
The Garden of Eden, a criticism on the views of certain modern writers. By Hormuzd Rassam, Esq. Remarks by Sir G. G. Stokes, Bart., F.R.S., Sir J. W. Dawson, C.M.G., F.R.S., Professor A. H. Sayce, D.D., Mr. T. Pinches, Colonel Conder, D.C.L., &c., M. Bertin, and others. With a map engraved by Mr. Stanford from the official surveys.
Annual Meeting.
Islâm. By Rev. W. St. C. Tisdall, M.A. Remarks by Sir T. Ford, Colonel Conder, D.C.L., Dean Goulburn, Rev. Dr. Kœlle, Rev. H. Lansdell, D.D., M.R.A.S., Mr. Rassam, and other authorities.

99. On the Reality of the Self. By W. L. Courtney, M.A., LL.D.
Notes on the Philosophy and Medical Knowledge of Ancient India. By Surgeon-General Sir C. A. Gordon, M.D., K.C.B., Q.H.P. Remarks by Sir Joseph Fayrer, K.C.S.I., F.R.S., and others.

100. On the Apparent Cruelty of Nature. By Rev. T. Wood, M.A. Remarks by Sir J. Fayrer, K.C.S.I., F.R.S., and others.
Deontology. By the Rev. H. J. Clarke.

VOL. XXVI.

101. The Route of the Exodus. By Dr. E. Naville. Speeches by Sir J. Fayrer, K.C.S.I. Sir J. Coode, K.C.M.G., and others.
From Reflex Action to Volition. By Dr. Alex. Hill, Vice-Chancellor of Cambridge University, with important discussion.

102. The Weak Sides of Natural Selection. By J. W. Slater, F.C.S., F.E.S. Remarks by Professor E. Hull, LL.D., F.R.S., and many others.
On Serpent Worship and the Venomous Snakes of India. By Sir Joseph Fayrer, M.D., K.C.S.I., F.R.S. Remarks by Sir Richard Pollock, K.C.S.I., Surgeons-General W. B. Beatson Cornish, C.I.E., C. A. Gordon, C.B., Admiral H. D. Grant, C.B., and others, and an important special report by Dr. A. Mueller, of Australia.

103. Some recent Discoveries in the Realm of Assyriology. By T. G. Pinches, Esq., Brit. Mus. Remarks by Colonel Conder, R.E., D.C.L., M. Bertin, Mr. W. St. C. Boscawen, Rev. H. G. Tomkins, and others.

The Philosophic Basis of the Argument from Design. By Professor Bernard, D.D., T.C.D.

On Flint Bodies in the Chalk known as Paramoudra. By E. Charlesworth, Esq. F.G.S. Illustrated.

104. The Glacial Period and the Earth-movement Hypothesis. By Professor James Geikie, D.C.L., F.R.S. Remarks by Professors E. Hull, LL.D., F.R.S., Logan Lobley, F.G.S., Major-General Drayson, R.E., F.R.A.S., Mr. W. Upham, U.S. Govt. Assist. State Geologist, &c., &c.

Useful and Ornamental Stones of Ancient Egypt. By Sir J. William Dawson, C.M.G., F.R.S. Remarks by W. H. Hudleston, F.R.S., President of the Geological Society, Professor E. Hull, F.R.S., Mr. W. Brindley, F.G.S., Colonel Conder, R.E., D.C.L., Professor Logan Lobley, and others.

Causes of Climatal Changes. Current opinions reviewed by Sir J. W. Dawson, C.M.G., F.R.S.

VOL. XXVII.

105. The work of the Institute in the present day. By the Right Hon. Lord Halsbury, P.C., F.R.S., with speeches by Sir H. Barkly, G.C.M.G., K.C.B., F.R.S., Sir G. Buchanan, F.R.S., Sir J. Fayrer, K.C.S.I., F.R.S., Sir F. Young, K.C.M.G., Professor E. Hull, F.R.S., and others.

The Principles of Rank among Animals. By Professor H. W. Parker, M.D.

On the Recession of Niagara Falls. By W. Upham, Assist. Geologist U.S. Govt.

106. How the Waters of the Ocean became Salt. By Professor E. Hull, LL.D., F.R.S. Remarks by Professor J. Tyndall, D.C.L., F.R.S., Sir J. Prestwich, D.C.L., F.R.S., and others.

The List of Shishak. With map. By Professor Maspero. With important discussion.

An Inquiry into the Formation of Habit in Man. By Dr A. T. Schofield. Remarks by Dr. Alex. Hill, Master of Downing, Sir C. A Gordon, K.C.B., Professor Parker, &c., &c.

107. On the Alleged Scepticism of Kant. By W. L. Courtney, LL.D. Remarks by Archdeacons Sinclair (London) and Thornton (Middlesex), Professors Bernard, Duns, and numerous others.

On the Comparison of Asiatic Languages. By Colonel C. R. Conder, R.E., D.C.L. Remarks by Professor Legge (Oxford), and others.

108. A Possible Cause for the Origin of the Tradition of the Flood. By Sir J. Prestwich, K.C.B., D.C.L., F.R.S. Remarks by Sir J. W. Dawson, C.M.G., F.R.S., Sir H. Howorth, K.C.I E., M.P., F.R.S., Dr. H. Woodward, F.R.S., President of the Geological Society, Professor T. McK. Hughes, M.A., F.R.S., Professor T. Rupert Jones, F.R.S., Mr. J. Allen Brown, F.G.S., Rev. J. M. Mello, F.G.S., Mr. W. Upham, Assist. Govt. Geologist, U.S.A., and many others.

VOL. XXVIII.

109. The Religious ideas of the Babylonians. By T. G. Pinches, M.R.A.S., British Museum. Remarks by Colonel Conder, R.E., D.C.L., Rev. Dr. Löwy, Professor Fritz Hommel, &c.

Chinese Ethics and Philosophy. By Sir Charles Gordon, K.C.B. Special statement by Sir Thomas Wade, G.C.M.G., K.C.B., &c.

On the Luminiferous Ether. By Sir G. G. Stokes, Bart., *President*. Speeches by His Excellency the Hon. T. F. Bayard, United States Ambassador, Sir H. Barkly, G.C.M.G., K.C.B., F.R.S., Sir Joseph Fayrer, K.C.S.I., F.R.S., Professor Hull, F.R.S., Admiral Grant, C.B., R.N., &c. (Annual Meeting).

110. Evolution and Design. By G. Cox Bompas, F.G.S. Remarks by Professor Blake, F.G.S., Rev. J. M. Mello, F.G.S., &c.

Archæology and Evolution. By R. H. Walkey. Remarks by Professor Lobley, F.G.S., &c.

Holy Scripture illustrated and confirmed by recent discoveries in the East. By Professor E. Hull, F.R.S. Remarks by Professor J. H. Gladstone, F.R.S., Colonel Conder, R.E., Mr. Rassam, &c.

111. Buddhism and the Light of Asia. By Rev. R. Collins, M.A. Remarks by Professor Legge, Rev. G. U. Pope, D.D., the Rev. Kenneth Macdonald, Professor Orchard M.A., B.Sc., Mr. R. Scott Moncrieff, and many others.

Stone Folk-lore. By Professor Duns. Speeches by the Right Hon. the Lord Chancellor, Sir H. Barkly, G.C.M.G., K.C.B., F.R.S., Sir G. Buchanan, F.R.S., Sir J. Fayrer, K.C.S.I., F.R.S., Professor Hull, F.R.S., Sir C. Gordon, K.C.B., His Honour J. Otonba Payne, &c. (Annual Meeting).

112. The Mechanical Conception of Nature. By Professor Macloskie, D.Sc., of Princeton College, U.S.A. Remarks by Rev. Prof. Bernard, D.D., G. B. Buckton, Esq., F.R.S., and others.

The Philosophy of Comte. By J. W. Slater, F.C.S., F.E.S.

On the supposed discovery of Remains belonging to an animal intermediate between man and the ape. By Professor E. Hull, F.R.S. (illustrated).

The Passage of the Red Sea by the Israelites. By Major-General Tulloch, C.B., C.M.G. (with map).

VOL. XXIX.

113. Jubilee Volume. Annual Address: The Perception of Light. By Sir G. G. Stokes, Bart., *President*. Speeches by Earl Halsbury (Lord Chancellor), Sir H. Barkly, G.C.M.G., F.R.S., Sir C. Gordon, K.C.B., Profs. E. Hull, F.R.S., and Sayce.

On Scientific Research and Biblical Study. By the Rev. Canon R. B. Girdlestone, M.A.

On Certain Inscriptions and Records Referring to Babylonia, Elam, and their Rulers, and other Matters. By Theophilus G. Pinches, M.R.A.S. With copies of tablets, &c., and arranged by the Author up to September 25th, 1897, with Opinions of Professors Hommel, Sayce, and others. Communication from Professor A. H. Sayce, D.D.

114. China's Place in Ancient History: A Fragment. By Surgeon-General Sir Charles A. Gordon, M.D., K.C.B., Q.H.P.

Communications from Her Majesty the Queen and Her Royal Highness Princess Henry of Battenberg.

The Polynesians and their Plant-Names. By H. B. Guppy, M.B. Communication from Professor Max Müller, Dr. John Fraser, F.R.S. (N.S.W.).

115. The Natural and the Artificial. By A. T. Schofield, Esq., M.D., M.R.C.S. Communications from Professor Lionel S. Beale, M.B., F.R.S., and others.

Causes of the Ice Age. By Warren Upham, Esq. Communications from Sir Joseph Prestwich, D.C.L., F.R.S. (late), Professor J. Geikie, LL.D., F.R.S., and others.

116. On Specimens in the Peter Redpath Museum of McGill University, illustrating the Physical Characters and Affinities of the Guanches or Extinct People of the Canary Islands. *Illustrated*. By Sir J. William Dawson, C.M.G., F.R.S., &c.

Professor Putnam on some Guanche Skulls. Communications from Professor J. Cleland, M.D., D.Sc., F.R.S., Dr. Lambert of Cairo.

Miracles, Science, and Prayer. By the Rev. Chancellor J. J. Lias, M.A.

VOL. XXX.

117. Annual Address: Chiefly on the Röntgen Rays. By Sir G. G. Stokes, Bart., *President*. Speeches by Earl Halsbury (Lord Chancellor), the Rt. Hon. Lord Kelvin, G.C.V.O., Sir H. Barkly, G.C.M.G., K.C.B., F.R.S., Sir Joseph Fayrer, Bart., K.C.S.I., F.R.S., Professor E. Hull, LL.D., F.R.S.

Biblical Lands; their races, customs, &c. (with Map). By Hormuzd Rassam, Esq. Remarks by G. Pinches, Esq., M.R.A.S. (of British Museum), &c.

118. The History of Mānikka Vācagar, "the Foe of the Buddhists." By the Rev. G. U. Pope, D.D., with Appendix for Students.

List of Publications in the Institute's Transactions on the Religions of the East.

On some Relations of Mind and Body. By A. T. Schofield, M.D., with communications from Professors Calderwood, LL.D., J. Cleland, M.D., F.R.S., and Dr. Sansom.

The Classification of the Vertebrata. By Prof. J. Cleland, F.R.S., J. Hutchinson, Esq., F.R.S., Inspector-General J. D. Macdonald, F.R.S., Prof. H. W. Parker, Dr. W. Kidd, &c.

119. The Proposed Scheme for the Embanking the Waters of the Nile. By Professor E. Hull, LL.D., F.R.S. Remarks by Baldwin Latham, M.I.C.E., &c.

Problems of Aboriginal Art in Australia. By the Right Rev. Bishop Thornton, D.D.

On Primitive Man. By Rev. J. M. Mello. Communications from Sir J. W. Dawson, C.M.G., F.R.S., Professors T. Rupert Jones, F.R.S., E. Hull, F.R.S., H. G. Seeley, F.R.S., and others.

120. Investigations regarding the submerged Terraces and River Valleys bordering the British Isles. By Professor E. Hull, LL.D., F.R.S. Remarks by Cavaliere W. P. Jervis, Director of the Royal Museum, Turin, Professors Etheridge, F.R.S., T. Rupert Jones, F.R.S., Logan Lobley, F.G.S., &c.

VOL. XXXI.

121. Annual Address. The age of the Earth as an abode fitted for life. By the Right Hon. Lord KELVIN, G.C.V.O. Speeches by the Right Hon. Earl HALSBURY, P.C., F.R.S. (Lord Chancellor), Sir G. G. STOKES, Bart., F.R.S. (the President), Sir JOSEPH FAYRER, Bart., F.R.S., Sir SIDNEY SHIPPARD, G.C.M.G., Captain E. W. CREAK, R.N., F.R.S. Design in Nature. By Lord KELVIN. A note.

Where is Mount Sinai? By Professor E. HULL, LL.D., F.R.S., with the Ordnance Survey Map reduced.

Design as exemplified in the formation of the human foot. A note by Dr. GERARD SMITH, M.R.C.S.

122. Herodotus. His remarks bearing on Egyptian Geology in the light of recent Egyptian Research. By Rev. F. A. WALKER, D.D., F.L.S. Copious remarks by Sir J. W. DAWSON, C.M.G., F.R.S.

Herodotus. His remarks bearing on Egyptian Botany and Investigation. By same.

Physical conditions of the Mediterranean Basin which have given rise to a community of some species of Fresh Water Fishes in the Nile and Jordan Basins. By Professor E. HULL, F.R.S. (with map).

Tithe Giving amongst Ancient Pagan Nations. A plea for the Unity of the Human Race in early times. By Rev. H. LANSDELL, D.D., M.V.I., M.R.A.S., F.R.G.S. A note, Philological reasons for the same, given at the Congress of Orientalists by the Right Hon. F. MAX MULLER, M.A., D.C.L.

123. Another possible cause of the Glacial Epoch. By Professor E. HULL, LL.D., F.R.S. (with map), with remarks by Professors T. RUPERT JONES, F.R.S., W. S. GRESLEY, F.G.S., United States, Cavaliere JERVIS, F.G.S., Italy, and others.

The Literature of Egypt in the time of Moses. By J. N. FRADENBURGH, Ph.D., D.D., LL.D. With remarks by Colonel C. R. CONDER, R.E., D.C.L., &c.

Plan and purpose in Nature. By Dr. W. KIDD. Remarks by Professors LIONEL S. BEALE, F.C.S., E. HULL, F.R.S., J. H. GLADSTONE, Ph.D., F.R.S., and others.

The Star Worshippers of Mesopotamia. By Rev. S. M. ZWEMER, F.R.G.S. With remarks by Dr. T. CHAPLIN and Colonel C. R. CONDER, R.E., D.C.L.

124. Annual Address: The Perception of Colour. By Sir G. G. STOKES, Bart., F.R.S., V.D. Speeches by the Right Hon. Lord KELVIN, G.C.V.O., F.R.S., the Right Hon. Lord LISTER, P.R.S., Sir C. GORDON, K.C.B., Archdeacon THORNTON, &c.

Sub-Oceanic Terraces and River Valleys off the coast of West Europe. By Professor E. HULL, LL.D., F.R.S. (with three plates). Remarks by Professors ETHERIDGE, F.R.S., T. McK. HUGHES, F.R.S., Cavaliere JERVIS, F.G.S., of the Royal Museum, Turin. General MCMAHON, F.R.S., &c.

VOL. XXXII.

Annual Address: Our Coal Resources at the close of the Nineteenth Century. By Professor E. HULL, LL.D., F.R.S. Speeches by the President, Sir G. G. STOKES, Bart., F.R.S., Sir JOSEPH FAYRER, Bart., K.C.S.I., Rev. CANON GIRDLESTONE, M.A., and the Ven. Archdeacon THORNTON, D.D.

The Unity of Truth: Being the Annual Address to the Victoria Institute for 1899. By the Right Hon. Sir RICHARD TEMPLE, Bart., G.C.S.I.

Life as compared with the Physical Forces. By J. W. SLATER, Esq., F.C.S., F.E.S. Remarks by Professor LIONEL S. BEALE, F.R.S., Rev. Professor BERNARD, Dr. R. C. SHETTLE, &c.

The Worship and Traditions of the Aborigines of the Islands of the Pacific Ocean. By Rev. M. EELLS, D.D., with remarks by DAVID HOWARD, Esq., D.L., Professor H. L. ORCHARD, M.A., D.Sc., &c.

The Climate of Egypt in Geological, Prehistoric, and Ancient Historic Times. By Dr. GRANT BEY.

Remarks on the Past, Present, and Future of the Australian Flora. By Rev. W. WOOLLS, Ph.D., F.L.S., with remarks by Sir FREDERICK YOUNG, Surgeon-General Sir C. A. GORDON, and a communication from (the late) Baron F. VON MUELLER, Ph.D., F.R.S.

The Sub-Oceanic River-Valleys of the West African Continent and of the Mediterranean Basin (with Map). By Professor E. HULL, M.A., LL.D., F.R.S. Communications from Professor T. RUPERT JONES, F.R.S., Cavaliere W. P. JERVIS, F.G.S., and Professor J. LOGAN LOBLEY, F.G.S.

The Human Colour Sense and its accordance with that of Sound, as bearing on the "Analogy of Sound and Colour" By Dr. JOHN D MACDONALD, I.H.R.N., F.R.S.

Creation or Evolution. By Dr. Walter Kidd, F.Z.S., with communications from Major Turton, R.E., and Dr. J. H. Gladstone, F.R.S.

Common Errors as to the Relation of Science and Faith. By Professor G. Macloskie, D.Sc., LL.D.

The Scope of Mind. By Dr. Alfred T. Schofield, M.R.C.S., with communications from Professors J. Cleland, F.R.S., Lionel Beale, F.R.S., Dr. R. Jones, F.R.C.S., and R. Anderson, Esq., C.B., LL.D.

Nationality. Likenesses and Differences which point to many Races making up what are called Nationalities. By Professor T. McKenny Hughes, F.R.S., with remarks by the Right Rev. H. B. Whipple, D.D., Bishop of Minnesota, Professor Westlake, LL.D., Colonel Conder, R.E., &c.

Marks of Mind in Nature. By Rev. Professor J. Duns, D.D., F.R.S.E.

Thalassographical and Thalassological Notes on the North Sea. By Sgr. Cavaliere W. P. Jervis, F.G.S. (with Map), with remarks by Professors E. Hull, LL.D., J. Logan Lobley, F.G.S., Rev. G. F. Whidborne, F.G.S., &c.

The Nature of Life (Part I). By Professor Lionel S. Beale, F.R.S., with remarks by Dr. Shettle, Professor Orchard, M.A., B.Sc., and Rev. J. Tuckwell.

VOL. XXXIII.

Annual Address: The Origin of New Stars. By Professor Sir Robert S. Ball, LL.D., F.R.S. Speeches by the President, Sir G. G. Stokes, Bart., F.R.S., and the Rev. Canon Girdlestone, M.A.

A short account of the Congrès International d'Histoire des Religions: held in Paris, September, 1900. By Theophilus G. Pinches, Esq., LL.D., F.R.A.S.

Vitality. By Professor Lionel S. Beale, F.R.C.P., F.R.S., with remarks by Dr. A. T. Schofield, Professor E. Hull, LL.D., F.R.S., Professor Orchard, M.A., B.Sc., and Mr. David Howard, D.L.

On the Being of God. By the Ven. Archdeacon Sinclair, D.D. Remarks by Professor Orchard, Rev. John Tuckwell, and Dr. Walter Kidd.

The Philosophy of Education. By A. T. Schofield, Esq., M.D.

Ethics and Religion. By the Rev. Prebendary H. Wace, D.D., with remarks by Rev. Dr. Walker, Rev. John Tuckwell, and others.

Methods of Protection among Animals. By Walter A. Kidd, Esq., M.D., F.Z.S. Remarks by Professor Hull, F.R.S., and Professor Orchard.

Questions Involved in Evolution from a Geological Point of View. By Rev. G. F. Whidborne, M.A., F.G.S., remarks by Mr. Martin Rouse, B.L., and Rev. John Tuckwell.

Eolithic Implements. By Rev. R. Ashington Bullen, B.A., F.G.S., with remarks by Professor E. Hull, Professor Rupert Jones, F.R.S., and others.

Visit to the Hittite Cities, Eyuk and Boghaz Keoy. By Rev. G. E. White, Marsovan. Remarks by Dr. Theophilus G. Pinches, David Howard, Esq., D.L., and others.

Recent Investigations in Moab and Edom. By Major-General Sir Charles W. Wilson, K.C.M.G., F.R.S. Remarks by Rev. Canon Girdlestone and Professor E. Hull.

Address of Condolence to H.M. the King on the Death of H.M. Queen Victoria.

Ancient Script in Australia. By E. J. Statham, Esq., Assoc.M.Inst.C.E. Remarks by Sir G. G. Stokes, Bart., F.R.S., Commander G. P. Heath, R.N., and others.

Meeting, Monday, 1st April, 1901. Gracious reply from H.M. the King to the Address of Condolence; sent through the Home Secretary.

The Maori's Place in History. By Joshua Rutland, Esq. Remarks by Dr. T. G. Pinches, Rev. Dr. Walker, Rev. W. Shaw, F.Z.S., and others.

Pictorial Art among the Australian Aborigines. By R. H. Mathews, Esq. Remarks by Professor Lobley, F.G.S., Rev. W. S. Lach Szyrma, M.A., and others.

The Wahābis: Their Origin, History, Tenets and Influence. By Rev. S. M. Zwemer. Remarks by Rev. G. F. Whidborne and Dr. H. W. Hubbard.

The Arab Immigration into South East Madagascar. By Rev. G. A. Shaw, F.Z.S., with remarks by E. S. M. Perowne, Esq., Professor E. Hull, Professor Orchard, and others.

Hornets: British and Foreign. By Rev. F. A. Walker, D.D., F.E.S.

The Divisions of the Ice Age. By Warren Upham, Esq., M.A., F.G.S.A. Remarks by Professor Hull, Professor Lobley, Dr. Pinches, and Rev. John Tuckwell.

The Sub-Oceanic Depression known as "La Fosse de Cap Breton," and the adjacent River Valleys of France and Spain. By Professor J. Logan Lobley, F.G.S., with remarks by Captain G. P. Heath, R.N., and Mr. David Howard, D.L.

VOL. XXXIV.

Annual Address: The Water Supply of Jerusalem. By Major-General Sir C. W. Wilson, R.E., F.R.S.
The Springs of Character. By A. T. Schofield, Esq., M.D.
Modifications in the Idea of God, produced by Modern Thought and Scientific Discovery, By Rev. Chancellor Lias, M.A.
The Preparation of the Earth for Man's Abode. By Professor J. Logan Lobley, F.G.S.
Adaptation and Selection in Nature: their bearing on Design. By Walter Kidd, Esq., M.D., F.Z.S.
Physical History of the Norwegian Fjords. By Professor Hull, F.R.S.
Physical History of the New Zealand Fjords. By J. M. Maclaren, F.G.S.
Iceland: Its History and Inhabitants. By Dr. J. Stefansson.
Artesian Water in Queensland. By R. Logan Jack, LL.D.
Locusts and Grasshoppers. By Rev. Dr. Walker, F.L.S.
Water essential to All Life. By Professor Lionel Beale, F.R.S.
Procopius's African Monument. By M. L. Rouse, B.L.
Some Diseases mentioned in the Bible. By Dr. T. Chaplin.

VOL. XXXV.

Annual Address. By Professor W. M. Flinders Petrie, D.C.L.
The Babylonian Story of the Creation, including Bel's Fight with the Dragon. By Theophilus G. Pinches, Esq., LL.D., M.R.A.S.
The Future of Islam. By Professor D. S. Margoliouth, D.Litt., Laudian Professor of Arabic, Oxford University.
The Arya Samaj. By Rev. H. D. Griswold, M.A., Ph.D., Missionary, Lahore, India.
On the Unseen Life of our World and of Living Growth. By Professor Lionel S. Beale, F.R.C.P., F.R.S., Government Medical Referee for England.
The Cheesewring, Cornwall, and its Teachings. By Professor Edward Hull, LL.D., F.R.S., F.G.S.
The Water Supply of Jerusalem. By Ernest W. Gurney Masterman, Diploma in Public Health, Cambridge.
Modern Theories concerning the composition of Holy Scripture. By Rev. John Tuckwell, M.R.A.S.
On the Geological Relationship of the Volcanoes of the West Indies. By J. W. Spencer, M.A., Ph.D., F.G.S.
Volcanic Action and the West Indian Eruptions of 1902. By J. Logan Lobley, F.G.S. F.R.G.S.
Report on the Congress of Orientalists held at Hamburg in September, 1902. By Theophilus G. Pinches, Esq., LL.D., M.R.A.S.
The Laws of the Babylonians, as recorded in the code of Hammurabi. By Theophilus G. Pinches, Esq., LL.D., M.R.A.S.
Lecture on "Experiences in South Africa during the War." By the Rev. W. H. Frazer, D.D., late Acting Chaplain to the Forces.
The Living God of Living Nature from the Science Side. By Professor Lionel S. Beale, F.R.C.P., F.R.S.

VOL. XXXVI.

Annual Address. By the Rt. Hon. the Earl of Halsbury, D.C.L., F.R.S.
The Genesis of Nature. By Rev. G. F. Whidborne, M.A., F.G.S.
Ancestral Worship (lecture). By Rev. Arthur Elwin.
Two Paths, one Goal. By Dr. Walter A. Kidd, F.Z.S. (being an examination of Bishop Temple's Bampton Lectures for 1884.)
On the Hot Lakes District, New Zealand. By Miss Hilda Boord.
Observations on Irrigation Works in India. By C. W. Odling, Esq., C.I.E., M.Inst.C.E.
On the Age of the Last Uprise in the British Isles. By Professor Edward Hull, LL.D., F.R.S.
On the Samaritan Text of the Pentatench. By Rev. Canon Garratt, M.A.
The Samaritan Passover of the year 1861. By Rev. Canon Hammond, LL.B.
The Conception of the Great Reality. By Sydney T. Klein, Esq., F.L.S., F.R.A.S.

On the Synchronous Chronology of the Kings of Israel and Judah. By Frederick Gard Fleay, Esq., M.A.
Notes on the Thickness of the Lucerne Glacier of the Post-Pliocene Period. By Professor Edward Hull, F.R.S.
Prehistoric Remains, with drawings, near Tenda, Italy. By Cav. W. P. Jervis, F.G.S.
On the Origin of the Marine (Halolimnic) Fauna of Lake Tanganyika. By W. H. Hudleston, Esq., M.A., F.R.S.

VOL. XXXVII.

Annual Address. By Dr. Silvanus P. Thompson, F.R.S.
The Right Way in Psychology. By Rev. F. Storrs Turner, B.A. Remarks by Dr. Schofield, Rev. J. Tuckwell, and others.
On Confucianism. By Rev. Arthur Elwin.
The Rajputs and the History of Rajputana. By Colonel T. Holbein Hendley, C.I.E. Remarks by General Halliday, Professor E. Hull, F.R.S., and others.
The Growth of the Kingdom of God. By Rev. J. Bradford Whiting, M.A.
Biblical Astronomy. By Lieut.-Colonel G. Mackinlay. Remarks by Commander Cabornе, C.B., Dr. Heywood Smith, Professor Sayce, Canon Girdlestone, and others.
Geological Exterminations. By Dr. Charles B. Warring, M.A. Remarks by Rev. Dr. Irving, Dr. W. Kidd, and others.
The Nebular and Planetesimal Theories of the Earth's Origin. By Warren Upham, Esq., M.A., F.G.S.A.
On Dr. Nansen's Bathymetrical Researches in the Arctic Ocean as Compared with those on the Atlantic Coast of Europe. By Professor E. Hull, LL.D., F.R.S.
The Resurrection of Our Lord and Saviour Jesus Christ (Address). By Rev. Canon R. B. Girdlestone, M.A.
The Influence of Physiological Discovery on Thought. By Edward P. Frost, Esq., D.L., J.P.
The Messiah of Qādiān. By Rev. H. D. Griswold, M.A., Ph.D. Remarks by Colonel Alves, Colonel Hendley, Mr. Rouse, Mr. J. O. Corrie, and others.
The Minerals and Metals mentioned in the Old Testament and their influence on the Social and Religious History of the Nations of Antiquity. By Cav. W. P. Jervis, F.G.S.

VOL. XXXVIII.

The Bearing of Recent Oriental Discoveries on Old Testament History. By Rev. John Urquhart. Being the essay for which "The Gunning Prize" was awarded by the Council.
Iceland: Its History and Inhabitants. II. By Dr. Jon Stefansson, Ph.D.
Evolutionary Law in the Creation Story of Genesis. By Rev. A. Irving, B.A., D.Sc.
Biological Change in Geological Time. By Professor J. Logan Lobley, F.G.S., F.R.G.S.
The Bible Pedigree of the Nations of the World, as attested and expanded by ancient Records and Traditions, and by early and long-lasting national Names. By Martin L. Rouse, Esq., B.L.
The Bearing of Recent Oriental Discoveries on Old Testament History. Being the second in order of merit of the "Gunning Prize Essays." By Rev. Andrew Craig Robinson, M.A.
The Early Celtic Churches of Britain and Ireland (with illustration). By Miss Eleanor H. Hull, author of *Early Christian Ireland*, etc. With lantern illustrations.
The Bible in the Light of Modern Science. Abstract of a Lecture delivered by William Woods Smyth, Esq., F.Med.Soc.Lon. With lantern illustrations.
Ice or Water. By Sir Henry Howorth, D.C.L., F.R.S. Review by Professor Edward Hull, LL.D., F.R.S. (Secretary)
The Zodiacal Arrangement of the Stars: in its Historical and Biblical Connections. By Rev. A. B. Grimaldi, M.A. (Camb.).
The Morning Star in the Gospels. By Lieut.-Colonel George Mackinlay, R.A. (Ret.).

VOL. XXXIX.

Annual Address. The Development of the Religious Faculty in Man, apart from Revelation. By the Right Rev. Bishop Welldon, D.D.
Researches in Sinai. By Prof. W. M. Flinders Petrie, D.C.L. Review by the Secretary.
The San Francisco and Valparaiso Earthquakes and their causes (with map). By Warren Upham, Esq., D.Sc., F.G.S. (America).
The Scriptural Idea of Miracles. By Rev. Canon R. B. Girdlestone, M.A.
The Pedigree of the Nations. No. II. By Martin L. Rouse, Esq., B.L.
The History of the Spread of the European Fauna. By Prof. J. Logan Lobley, F.G.S.
Orissa: A little known province of the Indian Empire. With some personal Reminiscences. By C. W. Odling, Esq., C.S.I.
Survivals of Primitive Religion among the people of Asia Minor. By the Rev. G. E. White, Dean of Anatolia College.
Plant Distribution from an Old Standpoint. By H. B. Guppy, Esq., M.B., F.R.S.E.
Exploration of Asia Minor, as bearing on the Historical Trustworthiness of the New Testament. By Prof. Sir William M. Ramsay, D.C.L.
Recent Discoveries in Palestine in Relation to the Bible. By Dr. Ernest W. G. Masterman.
Mencius. By the Rev. F. Storrs Turner, B.A.

LONDON: HARRISON AND SONS, PRINTERS IN ORDINARY TO HIS MAJESTY, ST. MARTIN'S LANE.